BCEHS

Clinical Practice Guidelines 2021

Foreword

Clinical and Medical Programs - Joe Acker & Leon Baranowski

February 2021

Welcome to the new BCEHS 2021 Clinical Practice guidelines.

These guidelines have been created, updated, and revised to reflect the extended responsibilities placed upon out-of-hospital care providers in British Columbia. The guidelines incorporate changes in both urgent and emergency care, in recognition of the shift towards increased proportions of the initial assessment and urgent care work undertaken by out-of-hospital providers. These new Clinical Practice Guidelines include the management of sepsis, mental health, palliative care, and vulnerable populations.

BCEHS Clinical Practice Guidelines have grown over the last 3 years as a greater focus on the clinical care delivered to patients increases. The new structure and format will continue to enable responsive updates to be produced in alignment with enhancements and advancements in care possibilities. The provincial and collaborative approach to the development will remain valuable to the out-of-hospital care providers in British Columbia.

Built within the guidelines you will find important influences from human factors and behaviors. Special situations are also more specifically detailed with high risks, toxicity, and hazardous events. The drug monographs have also seen changes and improvements to support decision making, as well as a revised list which is available to us through the pharmacy.

We are proud of our publication of these guidelines and would like to acknowledge and thank all those who developed and contributed to the standards of care and practices within them.

Building on what once were treatment guidelines, these Clinical Practice Guidelines include some significant revisions and areas of the new guidance. As we look at meeting the variety of needs for our out-of-hospital care providers, we will continue to work with our development teams and stakeholders, as well as experts, in ensuring that they can access these guidelines in an effective and timely manner in a format that suits them and the environments in which they work.

Acknowledgments

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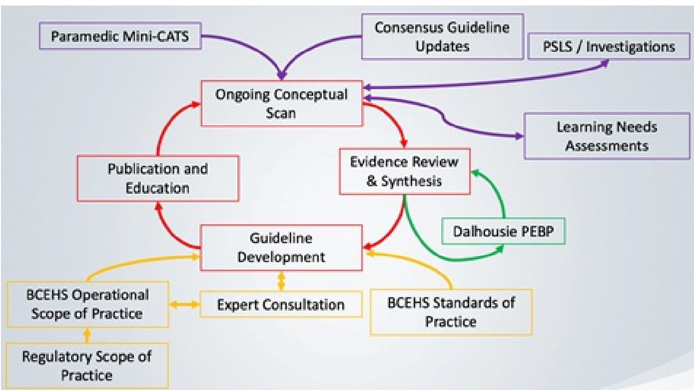
Guideline Development and Methodology

Mike Sugimoto, Clinical Medical Programs

The 2021 Clinical Practice Guidelines were developed over a period from the spring of 2019 through the fall of 2020. Paramedics, practice leaders, physicians, and subject matter experts worked together to draft, review, and approve over 120 guidelines on a wide range of topics. The authors of the individual guidelines drew inspiration for their work from a variety of sources, including pre-existing BCEHS practice, experience through the BC Patient Safety Learning System, examples of practices in other jurisdictions, and the most current guidance from various organizations such as the Canadian Cardiovascular Society and Trauma Services BC. The process was open to staff from across the province, and over 40 people ultimately submitted draft guidelines for consideration.

As the guidelines were being written, authors consulted with the Dalhousie Prehospital Evidence Base Project (PEBP) to examine the current state of knowledge with respect to out-of-hospital care. The PEBP is an attempt to make sense of disparate studies across a variety of disciplines that may offer insight into best clinical practices in out-of-hospital care. This project is still in its early stages, but the process of critical appraisal and practice contextualization is not. Results from the PEBP informed the development of the 2021 practice guidelines, and each guideline refers to a specific set of evidence. It is important to note that although the PEBP may strongly support a particular intervention, this does not mean that it will be automatically included in the BCEHS CPGs – incorporation is the result of a considered analysis and takes into consideration many factors, including regulatory scopes of practice, practitioner capacity, cost effectiveness, and educational needs.



Guideline development is an inherently iterative process. As guidelines are developed and implemented, BCEHS learns about the successes and challenges of each document or process; this experience in turn informs how future guidelines are produced or modified. Regular, on-going reviews of the guidelines help ensure they remain up to date and relevant.

The Process of Practice Change

The guideline development process also offers a framework for practice change. By situating new ideas within a practical context, and through the creation of a guideline that reflects the desired development

1. Conduct a mini-critically appraised topic: review and synthesize available evidence to produce a recommended practice change.
2. Contextualize the evidence in BCEHS practice: draft a practice guideline that outlines how the change should be implemented within BCEHS.
3. Submit mini-CAT and proposed guideline to Clinical and Medical Programs for review.

Many practitioners have recommendations for practice changes that run into limitations imposed by the statutory scope of practice. Use of the CPG development framework constructs an argument not only for changes to BCEHS practice, but also the regulatory limits of out-of-hospital practice in British Columbia. The process is slow and sometimes frustrating, but real change is possible – for example, the communication tools advocated for in A03: Clinical Handover and the assessment tools in K02: Sepsis are the direct result of recommendations by individual paramedics who followed this specific process.

Guideline Sustainment and Maintenance

Guidelines begin to age as soon as they are published. To prevent this from happening, BCEHS is forming a working group of interested CPG stakeholders, including representatives from various business units across BCEHS as well as from the training agencies, EMALB, first responder organizations, and other CPG user communities. The working group will be responsible for ensuring the guidelines continue to align with best practices and remain relevant to practitioners in British Columbia.

Working group members will be expected to complete the online Dalhousie Paramedic Evidence Based Practice Course and join the PEBP as an appraiser. Additional training in other evidence-based methodologies, including the use of the AGREE II guideline development and assessment tool, will also be required. Members will be assigned responsibility for particular areas of the CPGs and will perform regular surveys of the literature to identify upcoming trends or potential practice changes. The results of these surveys will be shared with the rest of the working group and considered for incorporation; the group will make recommendations to BCEHS Clinical and Medical Programs, which will retain overall editorial control of the content of the CPGs.

If you are interested in participating in this process, please e-mail handbook@bcehs.ca. A formal process for selecting BCEHS members will be unveiled soon.

We look forward to working with you.

Clinical Ethics for Out-of-Hospital Providers

Dr. Alexandra Olmos Perez
Reviewed: March 31, 2021

PHSA is committed to promoting reflective practice in the delivery of health care within a culture that values ethics. An ethical culture requires explicit values and principles which help to foster decisions that are ethically justifiable, appropriate, and accountable. By extension, there is an expectation of ethical behavior from all individuals in the organization.

Ethics is about determining the 'right' thing to do in each situation. In healthcare, we develop relationships with other health care providers, patients, and family members, and at times find that we have differing views, values, and expectations which may differ from situation to situation. Ethics provides a toolbox of theories, concepts, and processes to navigate the complexity of the relationships developed within the health care context through conversations about ***values*** and ***principles***.

Ethics: A philosophical discipline that studies the moral phenomenon (why do we think something is right/wrong, and is it really right/wrong). It also studies normative systems, such as morals (concrete rules about what we consider to be right/wrong) and the law. Questions about ethics are questions about values.

Values: They represent what is important to us. They drive our decisions, attitudes, behaviour, and are at the centre of what we define as culture. Theoretically, values are the result of the interaction of a (moral) subject, and an object (real things we can see or touch, or ideas, like love, friendship, justice, and happiness) in which the first performs a value action (which means we are not ambivalent and we react to something). That makes values very dynamic and therefore diverse. Even if we share some values with other individuals or groups, their interpretation of what is important or valuable could change because of how this interaction occurs (which is why there are different value systems). Also, value is an inter-subjective action, which means we never perform it in isolation, but in context and within our relationships with other people (other moral subjects). This influences how we interact and interpret things, and therefore how we value them.

Principles: Normative standards that outline a course of action within a specific framework. They express value in concrete situations, but unlike rules they are not prescriptive (if you don't follow them, consequences are not explicit) and they operate on optimization, which means that more than one principle can be applicable to the same situation and they can be balanced accordingly. To learn more about principles in the context of biomedical ethics, please refer to PHSA Ethical Practice Guide (this link usually doesn't work via the app; please use the desktop version to access).

Ethical issues arise when there is more than one option or course of action to choose from but the decision creates a conflict between two different values or principles.

Ethical issues in health care occur on a daily basis and include, but are not limited to the following domains:

- Shared decision making with patients/families
- Assent, consent, and surrogate decision-making
- Ethical practices in end-of-life care
- Patient privacy and confidentiality
- Professionalism in patient care
- Ethical practices in research
- Ethical practices in resource allocation

Healthcare providers, like anyone, have their own value systems or personal moral compass: our own conceptions about what is right and wrong. Nonetheless, because of their role as healthcare professionals to provide services that are "vital to the organized functioning of society" (Bayles, 1989), they therefore have obligations towards the public that should steer their actions when practicing healthcare including interactions with patients and families.

Professional integrity requires that we hold our convictions on the basis of reasons that could be, in principle, defensible: "a standing commitment to having the sort of judgment worth standing for" (Scherkoske, 2013). This means that every time we are faced with the question "what's the right thing to do?" we need not only to look for the answer within our personal moral compass, but reflect on how we can justify our decision to other people who might not share our views and values.

This means that when we are providing care, we need to be willing to be reasonable; respect others and be prepared to take into account their views and feeling to the extent of allowing one's own perspective to be changed by others (Pritchard, 2006).

In order to make sure that there is full consideration of ethically relevant factors in a given situation, there are tools that can help, such as ethical decision making frameworks. These frameworks are tools that aim to establish a systematic process for analyzing a case and identifying the main ethical issues and relevant considerations to determine the best course of action, all things considered. Using a framework helps to illuminate values in tension, possible options, and ethically justifiable decisions. This process can facilitate identifying and addressing systemic and personal ***biases*** and create a safe space for all relevant perspectives to be considered. While frameworks will not typically lead to an ideal or perfect solution, and disagreement may well persist, these tools do offer a basis for consensus as they aim to provide a fair, inclusive, and transparent process, where participants can feel engaged in a conversation that aims towards an ethically justifiable solution.

> *Bias:* Prejudice or unsupported judgments in favour of or against one thing, person, or group compared with another, usually in a way considered to be unfair. To learn more about how to identify unconscious biases and about anti-racism, click here to see the resources on the PHSA POD.

> *Procedural Justice* focuses on the fairness in the processes by which decisions are made. From this point of view, the quality of interpersonal interactions and experiences along the decision making process affect the perception that those involved and affected have about the outcome.

The frameworks enable individuals and teams to work together by introducing a shared systematic process, developing a shared language, facilitating communication, and building a common understanding of how to approach ethical challenges. Moreover, adhering to such a systematic process can ensure ***procedural justice*** which is essential in reaching socially acceptable, publicly accountable, and ethically appropriate decisions. To learn more about the available tools to support decision making in the context of out-of-hospital and inter-facility care, please refer to the PHSA Ethical Practice Guide (this link usually does not work via the app; please use the desktop version to access).

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Please visit ethics on the POD and this page on the Intranet for quick links to frameworks, ethics resources, and educational opportunities.

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A01: Clinical Approach

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Introduction

The clinical approach represents the minimum standard of assessment that paramedics and EMRs/FRs should provide for a patient. Patients in BCEHS care require ongoing assessments of their vital signs every 15 minutes to monitor trends. If this standard cannot be met, or is considered clinically unnecessary, the rationale should be documented. Patients who are unwell or predicted to deteriorate should have their vital signs monitored more frequently.

For the majority of patients, it will be appropriate to establish a personal rapport and to collect a verbal history prior to beginning any physical assessments. This process should not lead to excessive delays in obtaining vital signs. Critically ill or otherwise unwell patients require a more formalized primary survey and systematic approach to information gathering.

Essentials

BCEHS provides patient-centred care. This means that paramedics and EMRs/FRs will provide safe, effective, and compassionate patient-centred care in all interactions by:

- Treating patients, carers, and families with dignity and respect.
- Encouraging and supporting shared decision making by patients, their families, and carers.
- Communicating and sharing information with patients, their families and carers, and other members of their healthcare team.
- Obtaining consent and considering patient wishes and values in all decisions.

Paramedics must ensure that resuscitation equipment for cardiac arrest management is readily available at **every** patient encounter to promote patient safety for events where the patient's clinical condition is not fully known at the time of dispatch, or may differ from the dispatch information. This includes, at a minimum:

- AED or LifePak 15 monitor/defibrillator
- Jump kit with airway management equipment
- Suction device
- Oxygen

Additional Treatment Information

- **First, do no harm.** Paramedics and EMRs/FRs must act, at all times, with due consideration for the safety of patients:
  - Always assess the risk versus benefit of any treatment or procedure.
  - Advocate for the health and safety of all patients.
  - Demonstrate person-centred care by acting in a manner that ensures the patient's dignity, safety, privacy, confidentiality, and decision-making are maintained.
- **Professionalism, accountability, and responsibility.** Each paramedic's and EMR's/FR's professional and legal responsibilities are prescribed by:
  - The Emergency Medical Assistants Regulation and the Code of Ethics.
  - BCEHS Clinical Practice Guidelines, Pharmacology, Skills and Procedures.
  - Compliance with BCEHS Policies and Procedures, Practice Updates, and Safety Alerts.
- **Scope of Practice.** Paramedics and EMRs/FRs must treat within their own scope of practice as defined by BCEHS and the EMALB. Paramedics and EMRs/FRs cannot exceed the legal scope of practice for which they hold an EMA license (including Schedules 1 and 2), though their operational scope of practice can be limited or restricted by BCEHS (→ A04: Duty of Care).
- **Scene assessment.** Safety of the paramedic and EMR/FR, patient, and bystanders is of the utmost priority:
  - Scene assessment commences as soon as visual contact is made with the scene (CPG A02: Patient Assessment).
  - The dynamic risk assessment must be part of every clinical event. BCEHS does not expect paramedics and EMRs/FRs to place themselves at risk of injury during any patient encounter.
- **Infection Prevention and Control (IP&C).** The main goal of infection prevention and control is to prevent the transmission of health-

care-associated infections to patients and paramedic practitioners and EMRs/FRs:
  - The modern application of infection control is described as 'routine practices and additional precautions' which must be applied to every patient for every event.
  - Routine practice does not include the use of personal protective equipment (PPE). Paramedics and EMRs/FRs should apply a point of care risk assessment (PCRA) and, if a hazard exists, apply appropriate precautions (e.g., one of the three isolation procedures).
  - The single most effective IPAC procedure to control infections in the workplace and reduce the spread of infections is hand hygiene.
  - Gloves are task specific and meant for single use for change between procedures and patients. Their use does not replace the need for hand hygiene after their removal.
- **Communication.** Early activation of additional resources is essential:
  - Clear, confident, verbal and nonverbal communication is central to a patient's perception of professional care.
  - Communication must take into account the psychosocial needs of patients, family, and carers.
- **Treatment and Referral Decisions.** It is the responsibility of paramedics and EMRs/FRs to:
  - Perform a comprehensive patient assessment (→ A02: Patient Assessment).
  - Discuss and explain the patient's presenting clinical condition, including any related comorbidities, with the patient or their carer and determine the appropriate treatment and referral decisions.
  - Manage the patient as required through the application of the BCEHS Clinical Practice Guidelines.
  - If in doubt about the diagnosis and the specific treatment required, give basic supportive measures, minimize time on scene, and consult with CliniCall (1-833-829-4099) if possible.
- **Conveyance Decisions.** Time on scene must be kept to a minimum with only time critical and/or meaningful interventions performed on scene with additional treatment provided en route:
  - If the arrival time of clinical back-up is expected to exceed the time required to load and convey the patient to a hospital, paramedics and EMRs should convey the patient.
  - In the event that higher levels of care or additional resources are required for safe patient care, en route intercepts can be considered.
- **Choice of Clinical Pathway.** The clinical pathway is influenced by the patient's presenting condition and the relative proximity to a designated specialized care facility. Follow BCEHS clinical pathways when determining hospital destinations:
  - Stroke patients may bypass the local facility and proceed directly to a primary or comprehensive stroke centre as directed by the FAST-VAN Stroke Tool and regional stroke clinical pathways.
  - STEMI patients may bypass the local hospital and proceed directly to a facility with specialty expertise in reperfusion strategies, in accordance with regional patient pathways.
  - Trauma patients may bypass local facilities and be transported directly to a trauma centre. Follow guidelines in the local clinical pathways.
  - Certain patients may meet criteria to be conveyed to alternate destinations where local clinical pathways are available.
- **Alternative referral decisions.** When patients are not conveyed by ambulance, paramedics or EMRs must:
  - Provide the patient with information on how to manage their condition, what to do if their condition does not improve, and when to see their general practitioner.
  - Confirm the patient is able to mobilize, access transport, and attend alternative care facilities.
- **Ambulance off-load.** Prepare patient and equipment for off-loading:
  - Remove PPE prior to leaving the vehicle and perform hand hygiene.
  - If the patient's condition does not allow for the removal of PPE, remove and replace gloves prior to departing the ambulance.
  - On-going patient assessment and treatment continues at the receiving facility until the formal clinical handover takes place including serial vital sign assessments, continuation of various monitoring devices, and rechecking the effectiveness of interventions.
- **Clinical handover.** It is the responsibility of paramedics and EMRs/FRs to ensure they provide and/or receive a comprehensive clinical handover using the mnemonic ATMIST or SBAR (→ A03: Clinical Handover) whenever patient care responsibility changes from one clinician to another and to ensure they understand all care requirements for the patient:
  - Whenever possible, and when it is in the best interest of the patient, practitioners should provide the handover report with the patient in view of the accepting healthcare provider to facilitate patient recognition and encourage assessment as required.
  - It is recognized that extenuating circumstances may make it unacceptable to complete clinical handover in the presence of the patient.
- **Documentation.** Documentation is important and a clinical record is required for all patient contact (→ A06: Documentation Standards); patient care documentation must:

- Be accurate, as factual as possible, and provide a clear, concise, and complete account of the event.
- Be completed at the time of, or as close as practicable to, the event.
- Incorporate all treatments/interventions provided, including patient vital signs and assessment findings prior to and post treatment, and recording of ECGs where appropriate.
  - Note: In cases where a minimum of two sets of vital signs are not taken or recorded, paramedics and EMRs must document the reasons within the free text in the clinical record.
- Record the paramedic or EMR recommendations and reasons, including a summary of any communication between the paramedic or EMR and patients and/or carers.
- Record a copy of any first responder documentation.
- Record any advice provided by a Paramedic Specialist or the emergency medical services physician online support doctor.
- Record at least the minimum dataset required per CPG A06: Documentation Standards.
- Practitioners shall leave copies of the patient care record and any associated documentation with the receiving facility prior to leaving the facility. This may include uploading a digital version of the ePCR without printing a hard copy.
- When available, ECG's must include the patient name and copies of the pre/post treatment (e.g., SVT treatment with adenosine).
- Document and co-sign all controlled substance usage and wastage in the patient care record as per BCEHS MP 210.
- Ensure verbal orders from a physician, direction from a Paramedic Specialist, or communication with CliniCall are documented in the ePCR.
- Transcribed orders must fall within the scope of practice of the paramedic or EMR.

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. New South Wales Ambulance Service. Protocols & Pharmacology. 2020. [Link]

Practice Updates

- 2023-05-23: added minimum equipment requirement to Essentials

A02: Patient Assessment

Mike Sugimoto
Reviewed: December 2, 2020

Essentials

- The goal of patient assessment is to construct a mental model of the clinical condition under consideration and to develop an effective and appropriate care plan in a safe and appropriate environment.
- Regardless of the specific model used, all patient assessments must include, at a minimum:
  - A dynamic and ongoing risk assessment, both prior to and following contact with the patient.
  - A preliminary examination, made from first visual contact, intended to gather information on potential life-threatening hemorrhage, mechanism of injury, and establish a general impression of overall clinical condition.
  - A primary survey aimed at identifying life-threatening conditions to allow for prioritization of interventions.
  - The identification of a chief complaint and its associated history.
  - A clinical history of the patient, including current medications, any allergies, and current levels of intervention (as applicable).
  - Focused physical and functional exams to include or exclude relevant differential diagnoses.

Scene Control and Hazard Assessment

The assessment process begins prior to making contact with the patient. The scene survey forms the basis of the ongoing risk assessment that continues throughout the entire call; paramedics and EMRs/FRs must be aware of hazards in the patient's environment, including along the ingress and egress routes, and take appropriate steps to mitigate those hazards.

Guidance on managing specific hazards is outlined in the High Risk Hazard guide. In cases where hazards cannot be suitably controlled, or mitigation strategies are unclear, paramedics and EMRs/FRs should withdraw to a safe distance and seek additional resources. Withdrawing may be as simple as waiting in a hallway or involve leaving the scene completely and moving to a location that is known to be safe. Paramedics and EMRs/FRs must exercise judgment when deciding whether a scene is safe or not, and in all cases, err on the side of physical distance.

Control of the scene can be multifaceted. Wherever possible, lights on the ambulance should be used to illuminate paths to and from residences. Paramedics and EMRs/FRs must ensure a clear and direct route is continually available between the ambulance and the patient; doors should be left open, or at a minimum unlocked. When possible, uninvolved bystanders should be removed from the immediate area to protect the patient's privacy, to ensure paramedic and EMR/FR safety, and to minimize distractions while managing the patient.

In all cases, paramedics and EMRs/FRs must ensure that roles and responsibilities are clearly defined. Paramedics and EMRs/FRs should be particularly diligent about discussing these when confronted with cases predicted to be complex for any reason and the precise nature of that complexity will vary from paramedic and EMR/FR to paramedic and EMR/FR. Collaborative assessments making effective use of the skills of all providers at a scene will improve patient care.

Initial and Primary Survey

A significant amount of information can be obtained 'from the doorway', prior to making physical contact with the patient. The goal of the initial survey is to identify life-threatening hemorrhage requiring immediate control, identify a potential mechanism of injury, delegate responsibilities for spinal motion restriction, and formulate a general impression of the patient's overall condition. The overall impression can help paramedics and EMRs/FRs to establish priorities for care and to set the pace of the call; patients who appear unwell require more immediate assessment and intervention, while patients who appear well may benefit from a more relaxed tempo. Paramedics and EMRs/FRs should observe the patient's work of breathing, the appearance of their skin, and their mentation to form a general impression of the patient's condition and acuity.

Prior to beginning a formal primary survey, life-threatening hemorrhage must be controlled. This can be accomplished through the use of delegated direct pressure or placement of a tourniquet as needed. See D02: Bleeding for additional details on hemorrhage control.

The primary survey is intended to guide paramedics and EMRs/FRs in the identification of other life-threatening problems. The assessment should begin with an evaluation of the patient's level of consciousness using a coarse scale; patients will either be spontaneously alert, responsive to voice, responsive to pain, or unresponsive. If a pain stimulus is required, it should be appropriate for the diagnostic purpose: sternal rubs are generally unhelpful and should be avoided, while trap squeezes, supraorbital pressure, and fingernail pressure are more useful for establishing levels of consciousness and identifying focal neurological deficits.

In patients who are conscious, paramedics and EMRs/FRs should assess the airway, breathing, and circulation. Patients who are unconscious should have their circulation and breathing assessed simultaneously and chest compressions initiated if pulses are absent; formal assessment of the airway can be deferred until resuscitation is underway. In all cases, issues or problems identified in the primary survey must be managed immediately upon discovery, either directly by the attending paramedic or EMR/FR, or delegated as a task to other providers.

The primary survey should conclude with an evaluation of the patient's skin colour and temperature followed by a rapid but comprehensive physical exam tailored to the overall clinical scenario.

Following the completion of a primary survey and its associated interventions, a chief complaint must be identified, and a history of the chief complaint obtained.

Secondary Survey

At this point, vital signs should be taken (ideally by delegation). Paramedics and EMRs/FRs may have gathered enough information at this point to formulate an appropriate treatment plan, or they may need to interview the patient and conduct a physical examination to gain further details. Interventions or investigations that are time-sensitive should be performed at this point, while preparations are being made for conveyance of the patient if that is the most appropriate disposition.

Clinical Scores and Assessment Tools

BC Emergency Health Services advocates the use of the National Early Warning Score 2 (NEWS2) to identify patients at risk of rapid deterioration. NEWS2 scores should be obtained on all patients and used to guide clinical decision-making, particularly in the areas of conveyance, destination or clinical pathway selection, pre-arrival notification, ongoing monitoring, and emergency department advocacy. Note: SpO_2 Scale 1 is for patients not diagnosed with COPD; SpO_2 Scale 2 is for patients diagnosed with COPD.

Chart 1: The NEWS scoring system

Physiological parameter	Score						
	3	2	1	0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO_2 Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO_2 Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

Score	Clinical Risk	Practitioner Response
Aggregate score 0 - 4	Low	• Routine monitoring • Routine transport or referral pathway as required
Score of 3 in any individual parameter	Low - Medium	• Monitor carefully • Routine transport as required
Aggregate score 5 - 6	Medium	• Monitor carefully • Attempt to optimize oxygenation, ventilation, and perfusion • Consider advanced care intercept where available • Consider emergency transport to hospital • Consider pre-arrival notification • Consider CliniCall consultation
Aggregate score ≥7	High	• Monitor continuously • Maximize oxygenation, ventilation, and perfusion • Seek advanced care intercept, but do not delay transport in doing so • Emergent transport to hospital • Pre-arrival notification

NEWS2 is not intended to replace sound clinical judgment. Its purpose is to alert practitioners to the risk of sudden deterioration and to help identify those patients who require more aggressive monitoring, treatment, and advocacy. This is particularly valuable in the context of infectious diseases and suspected sepsis.

For pediatric patients, an equivalent scoring system -- the BC Pediatric Warning Score (PEWS) -- can be used for the same purposes as NEWS2.

BC PEWS Vital Signs Reference Card

Age	Heart Rate Beats per minute	Respiratory Rate Breaths per minute	Systolic / Diastolic BP	MAP mmHg
0 – 28 days*	104 – 162	31 – 60	60 – 80 / 30 – 53	40 or higher
1 – 3 months*	104 – 162	31 – 60	73 – 105 / 36 – 68	48 or higher
4 – 11 months*	109 – 159	29 – 53	82 – 105 / 46 – 68	58 – 80
1 – 3 years†	89 – 139	25 – 39	85 – 109 / 37 – 67	53 – 81
4 – 6 years†	71 – 128	17 – 31	91 – 114 / 50 – 74	63 – 87
7 – 11 years†	60 – 114	15 – 28	96 – 121 / 57 – 80	70 – 94
12 plus years†	50 – 104	12 – 25	105 – 136 / 62 – 87	76 – 103
Temperature °C	**Oral:** 35.5 – 37.5, **Axilla:** 36.5 – 37.5, **Rectal:** 36.6 – 38.0, **Temporal:** 36.3 – 37.8			

HR and RR ranges: CTAS 2013
Temperature ranges: CPS 2015
BP ranges: *Modified from American Heart Association (2012). *Pediatric emergency assessment, recognition, and stabilization (PEARS) provider manual.* † National Heart, Lung and Blood Pressure Institute (2004). The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics, 114(2)*, 555-556.

CHILD HEALTH BC
LEAD BENEFACTOR
save on foods

Treatment and Disposition

Paramedics and EMRs/FRs must exercise judgment and manage their time on-scene effectively. Tasks that have minimal effects on clinical outcomes should be deferred until the patient is en route to the destination facility. On-scene tasks should be limited to those procedures and interventions that will yield meaningful information that affects the overall management plan or that addresses an immediate and urgent patient need. Attending paramedics and EMRs/FRs should not feel pressured to perform all tasks: the effective use of one's partner and other responders is a hallmark of effective clinical practice and the delegation of tasks – obtaining vital signs, completing documentation, initiating vascular access – is critical to good time management while on-scene.

Scene Control Does not require patient contact	• Personal protective equipment selection and donning • Conduct initial risk and hazard assessment (risk assessment is ongoing throughout the call: if hazards become uncontrollable, leave the scene immediately) • Determine number of patients and any other resources required • Control scene (lighting, ingress/egress routes, access to doors and elevators)
Initial Assessment Conduct from a distance	• Assess for and control major hemorrhage • Establish mechanism of injury • Delegate spinal motion restriction as required • Determine general nature of illness or injury • Conduct "doorway survey": observe work of breathing, general mentation, circulation to skin

Primary Survey	• Level of consciousness
	  o If conscious: airway and breathing, circulation
	  o If unresponsive: circulation, airway, and breathing concurrently
	• Correct life-threatening abnormalities
	• Perform focused rapid physical exam
	• Identify chief complaint
	• Determine probable "pace" for call

Secondary Survey	• Obtain relevant clinical history • Conduct appropriate diagnostic testing (vital signs, ECG, etc.) • Expose and examine as required based on chief complaint • Delegate patient care activities as required
Treatment and Disposition	• Formulate diagnosis • Develop and implement treatment plan • Determine appropriate patient disposition

A03: Clinical Handover and Communication

Original by Shauna Speers and Leon Baranowski; updated by Rhonda Chartrand and Mike Sugimoto

Updated: 01 July 2023

Introduction

Effective communication during transitions of patient care from one health care provider to another, or handovers, is a critical component of a patient safety-centred culture. Ineffective handovers cause confusion and are the most common underlying cause of adverse patient events across health care, regardless of setting or the specific providers involved.

All health care professionals, including paramedics, emergency medical responders, first responders, nurses, and physicians have an obligation to ensure that patient information is appropriately and comprehensibly shared with other providers. A structured tool that promotes the use of a standardized handover format can significantly improve patient safety during critical phases of care, and encourages the development of a shared mental model that allows for more information sharing.

The ATMIST AMBO mnemonic tool is BCEHS's approach to structured and standardized handovers during most clinical scenarios. A separate tool, SBAR, is intended for use during clinical consultations (i.e., with CliniCall or EPOS). All providers, regardless of licensure or role, are expected to use the ATMIST AMBO tool for all transitions of care, both in- and out-of-hospital. The use of a structured handover tool is a required organizational practice for accreditation, highlighting its importance to strengthening patient safety.

Essentials:

To effectively perform a clinical handover, paramedics, emergency medical responders, and first responders should:

- Ensure an appropriate environment for handover with consideration for patient confidentiality and to limit non-critical interruptions during the handover.
- Provide relevant, timely, accurate information in common language without the use of abbreviations or jargon.
- Use a structured, standardized tool to provide this information.

Clinical handovers of critical patients should, ideally, include a 20-30 second period where the patient remains on the ambulance stretcher, with the receiving providers in a "hands off, eyes on" period while the structured handover is completed. The goal of this period is to minimize distractions during the handover, allowing providers to exchange information without having to compete with external tasks, conversation, or instructions, and to increase overall team situational awareness. Patient condition may not always permit this 20-30 second pause, however all providers must, while giving or receiving a handover report, focus directly on the handover itself rather than attending to additional patient care tasks.

General

A structured clinical handover tool is designed to provide a mechanism to consistently provide patient information during a transition of care. Structured tools work because they provide a standardized framework for the presentation and communication of relevant clinical data, formatting and organizing information in such a way as both the sending and the receiving providers know what to expect at each step of the handover. This standardized format speeds the creation of a shared mental model and reduces the chances that important information is accidentally missed or excluded in handover conversations.

British Columbia paramedics, emergency medical responders, and first responders use two handover tools: ATMIST AMBO and SBAR. Both reduce adverse events and improve the accuracy of information exchange, although they serve different roles. Providers working in the out-of-hospital care system in British Columbia must become familiar with these tools, and use them consistently while engaged in patient care activities.

ATMIST AMBO

STEP 1	**HANDS OFF / EYES ON / TEAM LISTENS TO REPORT**	
STEP 2	**ATMIST**	**Details**
	A AGE	Age, Name, Date of Birth
	T TIME	Onset of symptoms Time of injury
	M MECHANISM OF INJURY or MEDICAL COMPLAINT	Synopsis of mechanism Chief complaint
	I INJURIES	Injuries Exam Findings
	S SIGNS	Vitals GCS
	T TREATMENT	Treatment and response
	AMBO	**Details**
	A ALLERGIES	Including reactions
	M MEDICATION	Provide list
	B BACKGROUND	Past Medical/Social/Family History
	O OTHER	Any relevant information
STEP 3	**PAUSE / QUESTIONS FROM TEAM / HANDS ON**	

30 SECONDS

TARGET 60 SECONDS

The primary tool used during transitions of care between two providers is ATMIST AMBO. As with all structured tools, ATMIST AMBO is intended to present information in a logical, sequential fashion, with the most critical information presented earlier in the handover report. This tool is used when a paramedic, emergency medical responder, or first responder is transitioning care to another health care provider, including delegations of care in the out-of-hospital environment as well as bedside handovers in hospitals.

ATMIST is the recommended tool for pre-arrival notification to hospitals. Pre-arrival notification is **required** for the following patient types:

- ST elevation myocardial infarction
- Suspected stroke (FAST+ or FAST-VAN+)
- Cardiac arrest (post-arrest or with ongoing CPR)
- Patients meeting major trauma criteria
- Patients who are unstable, as defined by:
  - Systolic blood pressure below 90 mmHg
  - Heart rate above 130 beats/minute, or below 40 beats/minute
  - Respiratory rate above 30 breaths/minute, or below 8 breaths/minute
  - Requirement for high-flow supplemental oxygen therapy to maintain oxygen saturation
  - GCS less than 13
  - Impending airway compromise

- Restraints required
- Active labour and other maternity-related patients
- Patients with spinal motion restrictions in place
- Pediatric patients with a PEWS score of 5 or higher (or meeting major trauma criteria)
  - NB: Pre-arrival notification for pediatric patients is facility-specific. Consult local hospital guidelines.
- Significant drug or other toxic overdose with anticipated rapid decline (e.g., insulin, bupropion, beta blockers, tricyclic antidepressants, etc.)
- Suspected Covid or other infectious disease (e.g., tuberculosis, ebolavirus disease)
- Mass or multiple casualty incidents
- Interfacility transfers arriving from an airport
- Any predicted need for immediate pharmaceutical or therapeutic intervention upon hospital arrival

Paramedics should **consider** notifying hospitals prior to arrival in cases where:

- Paramedic discretion results in a heightened concern for patient condition
- High profile patients that may require extra security or crowd control
- Ischemic emergencies (e.g., leg or testicle)
- Ocular emergencies with vision loss
- Active atraumatic bleeding (e.g., epistaxis, vaginal or gastrointestinal bleeding)

Triage reporting *may* follow the ATMIST structure, but workflows vary between health authorities, and providers will need to remain flexible to the requirements of individual facilities and staff.

For the most critically ill patients – particularly during a handover to a team of providers – it is recommended that all providers observe a 20 to 30 second "hands off, eyes on" period where the attending paramedic delivers the ATMIST information without the distraction of on-going care activities and patient and equipment transitions. Depending on patient condition, this may not always be possible, although regardless of circumstances, the lead providers should try to ensure they can speak without interruption or distraction during the handover.

Under ideal circumstances, the complete ATMIST AMBO handover should take no more than 45 to 60 seconds, exclusive of the need for clarifying questions from receiving providers. This time is representative of experienced providers working collaboratively; early use of the tool, by providers unfamiliar with its novelty, may result in longer handovers – this is not considered problematic, and as providers will become more comfortable with the tool, times for handovers will shorten.

Health authority use of ATMIST AMBO varies. Regardless of whether a receiving provider is familiar with ATMIST AMBO, the use of a structured tool helps to organize and simplify a handover report; the onus of ensuring the tool is used rests with the provider delivering the report, not the recipient. Under some circumstances, such as low-acuity patient handovers, there is an opportunity for experienced providers to provide in-the-moment introductions to the tool; BCEHS encourages its paramedics, emergency medical responders, unit chiefs, and clinical operations managers to have those conversations with their colleagues to promote the use of ATMIST AMBO.

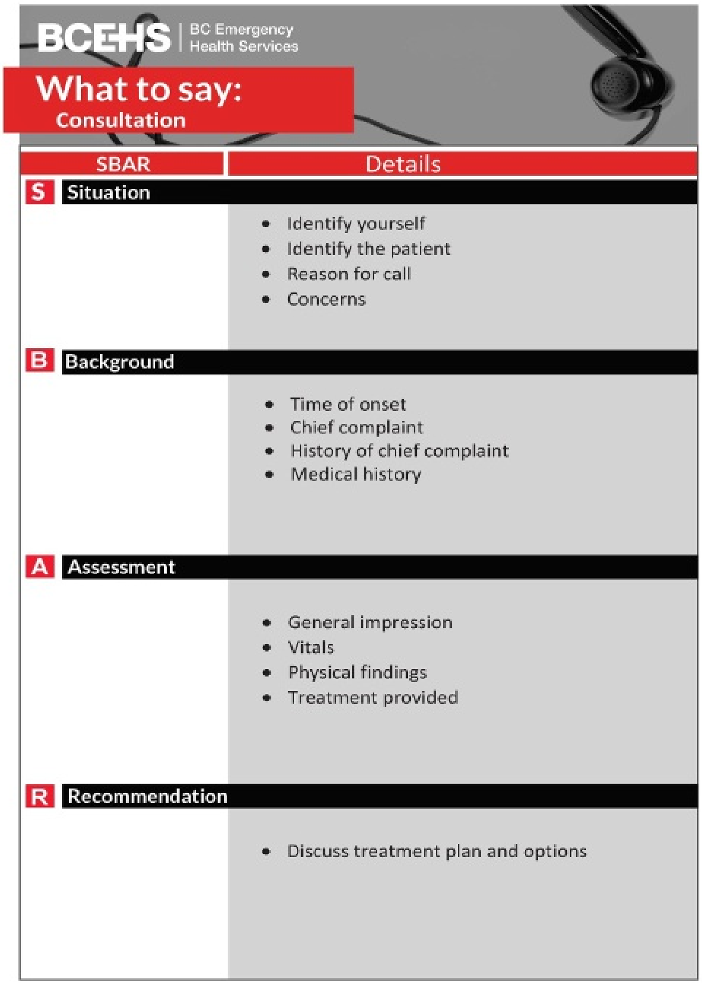
ATMIST AMBO should also be used during transitions of care outside of the hospital in alignment with → A13: Patient Care Planning for Handover, and regardless of whether the receiving paramedic or emergency medical responder was intimately involved in the on-scene care of the patient; recall that the purpose of the tool is to ensure critical information is not missed, and that an effective, shared mental model has been created between two providers.

The content of an ATMIST AMBO report can easily be seen on the attached visual aids. When delivering an ATMIST AMBO report, it may help to announce the title of each section before its accompanying information. Templating this material by writing it down prior to handover may help to organize and summarize patient information.

Keep material in each section short, clear, and concise; do not use excessive jargon or technical terminology – different providers use language differently, and concepts and terms may be different in the out-of-hospital and in-hospital realms. Plain language is always better than technical verbiage.

Speak loudly and clearly. Pause where appropriate, allowing time for listeners to hear and understand messages. Conduct handovers such that patient and privacy confidentiality may be preserved whenever possible.

SBAR



ATMIST AMBO is best suited for the transition of care between providers physically present with the patient. During consultations – such as those with CliniCall – an alternative format is preferred: SBAR. Like other structured communication tools, SBAR presents patient information in a consistent format to enhance shared clinical understanding and is functionally similar to ATMIST AMBO with one key difference –SBAR provides a brief, functional summary of the patient's status with the goal of making and obtaining recommendations for ongoing care. BCEHS Paramedic Specialists and Emergency Physicians are trained in the use of SBAR and will be familiar with it during all consultations.

As with ATMIST AMBO, clarity is preferred over conciseness. Because these are telephone conversations, ensuring that information has been accurately conveyed and understood is important – be sure the connection is clear and that both sender and receiver understand each other, and allow time for recipients to make notes before moving on to another element of the report. It may be helpful to template an SBAR by writing it out prior to making the phone call if time permits.

The use of SBAR for the delivery of patient information in other circumstances is deprecated, and should be replaced by ATMIST AMBO as soon as possible.

Resources

- LearningHub: [ATMIST AMBO Clinical Handover -- Health Authority Emergency Departments]

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Brighton Pediatric Early Warning Score

Brighton Pediatric Early Warning Score					
	0	**1**	**2**	**3**	**SCORE**
Behaviour	*Playing* *Appropriate*	*Sleeping*	*Irritable*	*Lethargic* ***&/OR*** *Confused* ***&/OR*** *Reduced response to pain*	
Respiratory	*Within normal parameters* *No recession or tracheal tug*	*10 above normal parameters, Using accessory muscles,* ***&/OR*** *30+% FiO2 or 4+ liters/min*	*>20 above normal parameters recessing/retractions, tracheal tug* ***&/OR*** *40+% FiO2 or 6+liters/min*	*5 below normal parameters with sternal recession/retractions, tracheal tug or grunting* ***&/OR*** *50% FiO2 or 8+liters/min*	
Cardiovascular	*Pink* ***&/OR****capillary refill 1-2 seconds*	*Pale* ***&/OR*** *capillary refill 3 seconds*	*Grey* ***&/OR*** *capillary refill 4 seconds* *Tachycardia of 20 above normal rate.*	*Grey and mottled or capillary refill 5 seconds or above* ***OR*** *Tachycardia of 30 above normal rate or bradycardia*	
Q15 minutes bronchodilators &/OR persistent vomiting following surgery (2 points each)					
TOTAL PEWS SCORE					

A04: Duty of Care

Joe Acker
Reviewed: December 2, 2020

Introduction

It is the responsibility of all BCEHS paramedics and EMRs to be knowledgeable of, and to work within, their approved scopes of practice as outlined in the BCEHS Clinical Practice Guidelines (CPGs) and to use the clinical approach and patient assessment CPGs for the initial assessment, reassessment, and treatment of all patients.

Patients may present with multiple clinical conditions, and in these cases, practitioners must apply clinically indicated practice guidelines concurrently while continually reassessing the patient's status and care needs.

Paramedics and EMRs must report deviations from clinical practice, patient safety events, near misses, and clinical errors via the Patient Safety Learning System (PSLS), and provide relevant information to support clinical case reviews and root-cause analyses.

Paramedics and EMRs shall accurately complete all required documentation including a patient care report for each patient encountered.

The paramedic or EMR on-scene with the most qualified designated role, as determined by BC Emergency Health Services, shall be the most responsible paramedic (MRP), or EMR. The MRP or EMR is responsible for determining the level and type of care required by the patient, both on-scene and during conveyance. This is best accomplished by ensuring all providers collaborate within their current scopes of practice (including any limitations or conditions that may exist), and by continually reassessing the level of care required.

This Clinical Practice Guideline provides guidance for the following considerations:

Section 1: Consent for care of minors

Section 2: Transfer of patient care between levels of care

Section 3: Consolidation of patient care at hospital

Section 4: Assessment and care of patients in custody

Section 5: Refusal of care

Section 1: Consent for Care of Minors

A minor is a person who is not an adult and is under the age of majority. The *Age of Majority Act* defines the age of majority as 19 years of age.

Paramedics and EMRs/FRs must obtain informed consent from parents or legal representatives prior to providing care for minors (exception 2.1).

Paramedics and EMRs/FRs may provide care to minors in situations where the parents or legal guardians are not present in circumstances where the delay of emergency medical care could cause significant harm to the patient. In these situations, paramedics or EMRs/FRs should attempt to contact a parent or legal guardian as soon as appropriate and document the circumstances regarding the care provided to minors without consent from parents or legal guardians.

Under the terms of the *Infants Act,* a mature minor may make decisions regarding their own health care. There is no single accepted definition of a mature minor. However, paramedics and EMRs/FRs must exercise judgement when deciding whether a minor could be considered a mature minor. Traits of a mature minor could include:

- A demonstrated ability to make independent decisions (e.g., calling 911)
- Actions taken in their own best interests
- The ability to make clear, independent judgements
- The capacity and intellectual ability to understand the risks and benefits of a proposed care plan
- Age between 14-19 years
- Living apart from parents (e.g., married/common-law)
- Economic independence and success at managing personal affairs

Paramedics and EMRs/FRs must document their reasons for granting mature minor status.

A mature minor's decision to give or withhold consent for health care cannot be overridden by parents or guardians.

Mature minors may be given care without consent in situations where the delay of emergency care could cause significant harm to the patient. In these scenarios, paramedics or EMRs/FRs should seek to obtain consent as soon as possible, and must document the circumstances around the care provided.

Paramedics and EMRs should contact CliniCall if there are concerns with respect to care plans for minors.

Paramedics and EMRs must arrange for mature minors to sign a Refusal of Care record on the PCR in situations where they refuse care or conveyance.

Section 2: Transfer of Patient Care

All BCEHS patients should be afforded care consistent with their immediate or expected clinical needs. If there is a perceived need for higher levels of care, or consultation, such care or guidance should be sought, either by intercept with another resource or through CliniCall.

Transfer of Care during Inter-Facility Transports (IFTs) Post Patient Medication Administration

When a patient has received medications outside the scope of practice of an EMR or PCP and requires conveyance to another facility, the EMR/PCP unit may convey if all of the following criteria are met:

- The patient does not require any further non-scope medications en route
- The patient's vital signs are within normal limits
- It has been a minimum of 15 minutes since the medication administration
- The patient meets local IFT guidelines for conveyance
- Consult CliniCall for direction in other extenuating circumstances where transfer of care is required

Transfer of Care during Newton's Cradle

(A 'Newton's Cradle' is a meet and transfer of patient care between 2 or more paramedic or EMR teams while conveying a patient over a long distance.)

A patient in ACP care can be transferred to PCP care if that patient is not anticipated to require any ACP interventions or assessments for the remainder of the trip. If an ACP-level intervention has been performed, PCPs are able to accept the patient provided the following criteria have been satisfied:

- The required level of care falls within the PCP scope of practice
- The patient's vital signs are within normal limits
- It has been a minimum of 15 minutes since an ACP intervention has been performed

Similarly, patients in PCP care may be transferred to EMR care, provided the patient's required care falls within the EMR scope of practice.

Transfer of Care

A patient in ACP care may be transferred to a PCP crew provided:

- The patient's vital signs are within normal limits
- The patient is not anticipated to require any further ACP interventions en route
- It has been a minimum of 15 minutes since an ACP intervention has been performed
- The transfer takes place in accordance with CPG AXXX: Transfer of Care

Transfer of care should not delay conveyance. In most situations, ACPs should convey patients to hospital when PCP crews are not readily available. CliniCall should be consulted in other extenuating circumstances when transfer of care is required.

Section 3: Consolidation of Patient Care at Hospital

When directed to do so by their unit chief, supervisor, manager, or local service standards, paramedic crews will consolidate patient care in a hospital or other health facility immediately following triage. Paramedics will manage care for up to 3 patients, or as directed. Of the 3 patients being cared for, no more than 1 patient may:

- Require cardiac monitoring
- Be hemodynamically unstable

- Require cervical spine precautions or spinal motion restriction
- Exhibit a Glasgow Coma Score < 13
- Be uncooperative, non-compliant, or aggressive

Multiple pediatric patients will not have their care consolidated.

Paramedics may determine that consolidation of care is inappropriate if the patient requires one or more of the following:

- The patient has been designated as requiring infection control or isolation precautions
- The patient is violent or requires the use of restraints

Except where the needs of the patient dictate otherwise, paramedics will consolidate care from ACP providers to PCP. Paramedics providing consolidated patient care will notify their dispatcher or supervisor if they are unlikely to be clear of the facility within 30 minutes following transfer of care. Where possible, patients will be transferred to a hospital stretcher, with side rails raised. If circumstances dictate that patients must remain on ambulance stretchers, paramedics should lower the stretcher to a medium height and secure the patient using shoulder, chest, and leg straps.

Patients will be monitored in accordance with the standards in Table 1. Paramedics providing consolidated care in health care facilities will do so in collaboration with the facility staff and will provide hourly updates on the condition of patients in their care. Significant changes in the status of a patient – such as alterations in vital signs, the progression of symptoms, or the patient attempting to leave the hospital prior to being assigned a bed – will be reported to facility staff immediately.

It is expected that paramedics will assist the patient and provide personal care as required.

Table 1. Monitoring standards for patients in consolidated care

Vital Signs q15 Minutes		Vital Signs q30 Minutes
Altered Vital Signs	*Complaints or Symptoms*	
• Heart rate <50 or >110/minute • Blood pressure < 90 mmHg • SpO_2 < 90% despite supplemental oxygen • Respiratory rate < 10 or > 24/minute • GCS < 13 • Temperature < 35°C or > 38°C	• Chest pain (resolved or ongoing) • ECG with ischemic or unstable changes • Shortness of breath • Altered mental status • Uncooperative / non-compliant or aggressive • Abdominal pain despite analgesia • Spinal motion restriction in place • Major trauma	• All other patients • NB: patients whose blood glucose level <4 mmol/L or >12 mmol/L will have their glucose levels reassessed hourly

In the event that paramedics are required to return to their communities for operational reasons, they will inform the triage nurse or BCEHS supervisor so that arrangements for the transfer of care can be made.

Upon transfer of patient care to another health care provider, BCEHS paramedics will provide a comprehensive verbal report using a clinical handover tool, such as SBAR or IMIST AMBO, as described in A03: Clinical Handover.

Section 4: Assessment and Care of Patients in Custody

The assessment and management of patients in custody requires a comprehensive approach. In conjunction with both A01: Clinical Approach and A02: Patient Assessment CPGs, paramedics and EMRs should use the following criteria when providing care for patients in custody:

- When visual limitations (such as a spit hood, restraints, or clothing) present a barrier to a comprehensive physical assessment, paramedics and EMRs should remove these items as necessary to complete an assessment, provided it is safe to do so.
- A person in custody who exhibits extreme intoxication, and who presents sufficient concern to warrant regular reassessment by paramedics or EMRs, should be conveyed at the time of first assessment.
- Individuals who are unable to safely walk or stand without assistance should not be left in custody.
- Law enforcement officers in British Columbia may use pepper spray (oleoresin capsicum, or OC), a less-than-lethal force option. OC is an aerosol lachrymatory agent that irritates the eyes and upper respiratory tract causing pain, lacrimation, temporary blindness, coughing, and difficulty breathing. The effects of OC cannot be completely neutralized, though they can be minimized.
  - Paramedics or EMRs must decontaminate patients in a well-ventilated area while wearing adequate personal protective equipment to avoid becoming affected
  - To decontaminate the patient, remove any contaminated clothing and flush with large quantities of water (or normal saline) for at least 20 minutes
  - Wash using soap and water; baby shampoo is ideal for this
  - Provide supportive care, and treat any conditions concurrently
- Conducted energy weapons (CEW), or Tasers, are a less-than-lethal force option used by British Columbia law enforcement. These devices fire two darts that embed in the body and deliver an electrical stimulus that interferes with the body's nervous system, inducing a forced contraction in the skeletal muscle, and causing the target to temporarily lose control of their muscles.
  - Patients who have been exposed to CEWs must be monitored for a minimum of 15 minutes after employment
  - A 12-lead ECG should be obtained if possible
  - Darts should be removed from the patient, unless they are embedded in the genitalia, neck, face, eyes, ears, oropharynx, scalp, or areas with significant superficial vasculature (e.g., antecubital fossa, or the femoral or popliteal areas)
  - To remove, confirm that the CEW has been turned off and cut the wire at the base of each dart; pull perpendicularly in a quick fashion on each dart and dispose of the darts in a sharps container
  - Clean dart wounds with alcohol swabs and apply a dressing as required
  - If the patient's tetanus status is unknown, or their date of last vaccination is over 10 years in the past, inform the law enforcement officers that a tetanus booster will be required within 72 hours

Paramedics and EMRs should approach all patients in custody with an intention to convey with a law enforcement escort. Patients in custody have the legal right to refuse medical treatment, however they do not have the ability to refuse conveyance to hospital.

- Occasionally, there may be controversy over whether a patient in custody requires conveyance to hospital. Police may solicit opinions from paramedics and EMRs as to the necessity of conveyance. In these cases, paramedics and EMRs should be inclined to convey, with special attention if:
  - The patient is pregnant
  - The patient has any of the following:
    - Chest pain or palpitations
    - Headache
    - Vomiting
    - Presyncope
    - Incontinence
    - Shortness of breath
    - Persistent confusion or combativeness
    - An injury, psychiatric disorder, or medical condition requiring immediate attention
    - A significant mechanism of injury meeting the definition of major trauma by mechanism alone
    - An inability to walk or stand safely without assistance
    - Heart rate < 60 or > 110 beats per minute
    - A systolic blood pressure < 100 mmHg or > 180 mmHg
    - A respiratory rate < 12 or > 24 breaths per minute
    - Oxygen saturations < 94% on room air
    - Blood glucose < 4.0 mmol/L or > 10.0 mmol/L

        - Temperature > 38°C

Paramedics or EMRs may otherwise leave patients in the custody of police after at least 15 minutes of observation. In these cases, paramedics or EMRs must consult with CliniCall prior to leaving the scene.

Patients in the custody of law enforcement may be restrained with handcuffs and/or additional restraints. If conveyance is required, a law enforcement officer with the ability to remove and control the restraints must be present in the ambulance. Consult with CliniCall with respect to treatment and conveyance decisions of restrained patients as necessary.

- Warning: Do not convey restrained positions in the prone position, due to the risk of positional asphyxia.

Law enforcement officers may deploy other less than lethal weapons to distract or temporarily incapacitate individuals, including stinger balls, rubber bullets, and beanbag rounds. These may result in blunt or penetrating trauma. Flashbangs, concussion grenades, and flash diversionary-incendiary devices may result in temporary loss of vision or hearing, and inhalation or flash burns. Treat injuries caused by these weapons in accordance with the appropriate guideline.

Section 5: Refusal of Care

Adults over the age of 18 years, mature minors, parents or legal representatives of minors, and legal representatives or guardians of adults, may refuse care or conveyance from BCEHS.

An adult patient is presumed to be capable of making decisions, unless there is evidence to the contrary. Paramedics and EMRs are required, in every case, to satisfy themselves that the patient has the requisite capacity to make decisions, understands the risks, benefits, and alternatives to their decisions, and is not unduly influenced by third parties.

Patients are presumed to lack capacity if their actions demonstrate they present a danger to themselves or others.

- A lack of capacity may be short-term; it may be related to:
    - A mental disorder
    - Intoxication by alcohol or drugs
    - Disability from acute illness or injury
    - The likelihood the patient will harm themselves or others
    - The inability to answer orienting questions (e.g., “what is your name?”, “where are you right now?”, “what day is it?”)

Paramedics and EMRs must not intentionally encourage or otherwise coerce patients to refuse care or conveyance. Patients have a right to access the care provided in hospital or other recognized resources available through ambulance conveyance.

Paramedics and EMRs are responsible for providing the patient with an opportunity to ask questions, and to provide answers that are understandable. The patient must be given the opportunity to accept or refuse care or conveyance, without fear, constraint, compulsion, or duress.

- In caring for patients who refuse care or conveyance, paramedics and EMRs will:
    - Attempt to perform as comprehensive an assessment as possible, provided the patient consents
    - Explain the benefits of receiving care or agreeing to conveyance
    - Explain the risks of refusing care or conveyance
    - Discuss alternative options available, including timely follow-up with a physician or health care provider, self-conveyance to hospital, or another call to 911 if conditions recur or worsen
- Paramedics and EMRs will consult with CliniCall where patients have:
    - A history of significant submersion injury
    - Recovered from a partial or complete foreign body airway obstruction
    - Experienced an apparent life-threatening event or a brief, resolved unexplained event
    - Complained of:
        - Chest pain
        - Shortness of breath
        - Abdominal pain
        - Headache
        - Fever > 38°C, either at present or within the last 24 hours
        - Heart rate < 50 or > 115 beats per minute
        - Respiratory rate < 6 or > 30 per minute
        - Oxygen saturation < 90% on room air

- CliniCall must also be consulted when the patient:
  - Has an abnormal 12-lead ECG
  - Has experienced a significant traumatic injury
  - Is a child or is over the age of 70
  - Is pregnant
  - Is intoxicated by drugs or alcohol
  - Has had a recent hospital visit for a similar concern
- Paramedics and EMRs must document the clinical assessment conducted and the discussion of risks and alternatives with the patient in the patient care record; the 'Response Outcome' field of the patient care record must indicate "Patient Refused Care and/or Conveyance"
- Paramedics and EMRs who are caring for patients refusing care or conveyance against advice may contact CliniCall for further consultation and advice; law enforcement may be involved in these cases, and care should be provided based on collaboration with other agencies or providers

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A05: Mass Casualty Incidents

Tim Makrides
Reviewed: December 2, 2020

Introduction

A mass casualty incident, or multi-casualty incident (MCI), exists when the initial response becomes overwhelmed. This occurs when the number of casualties exceeds the capacity of the initial resources, preventing effective management and conveyance. The successful management of a MCI requires the effective use of resources to create a balance between the available supply of responders, equipment, and assets to that of the MCI.

Experience has shown that in the event of a MCI, patient care is optimized if crews follow a pre-arranged plan. Scene management should include consideration of various factors including safety, site assessment, liaison, command, communications, triage, treatment, and conveyance.

Where practical, the first unit on scene should adopt the command and triage responsibilities while also ensuring pertinent information is provided to the dispatch centre and that appropriate resources are distributed as required. The initial scene commander and triage officer are responsible for their tasks until relieved by senior clinicians or supervisors.

The responsibilities for the first arriving crew can be divided as follows:

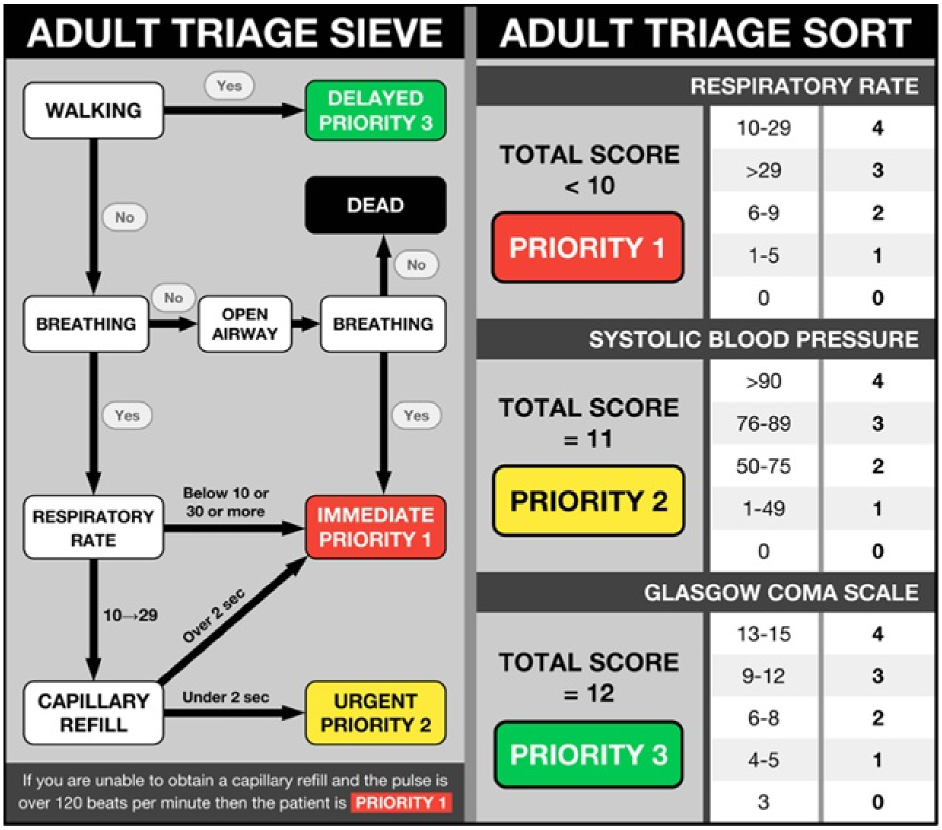
- Driver: The scene commander in urban and metro environments provides an initial windscreen situation report and collects information necessary for the METHANE report. The scene commander is the contact between the scene and the communication centre.

Methane Sitrep

M	Declare a **Major Incident** with Dispatch
E	Notify Dispatch of **Exact Location**
T	Notify Dispatch of **Type of Incident**
H	Advise on **Hazards** present at scene
A	Advice oncoming units of best **Access** to scene
N	**Number of patients**
E	Additional **Emergency Services** required

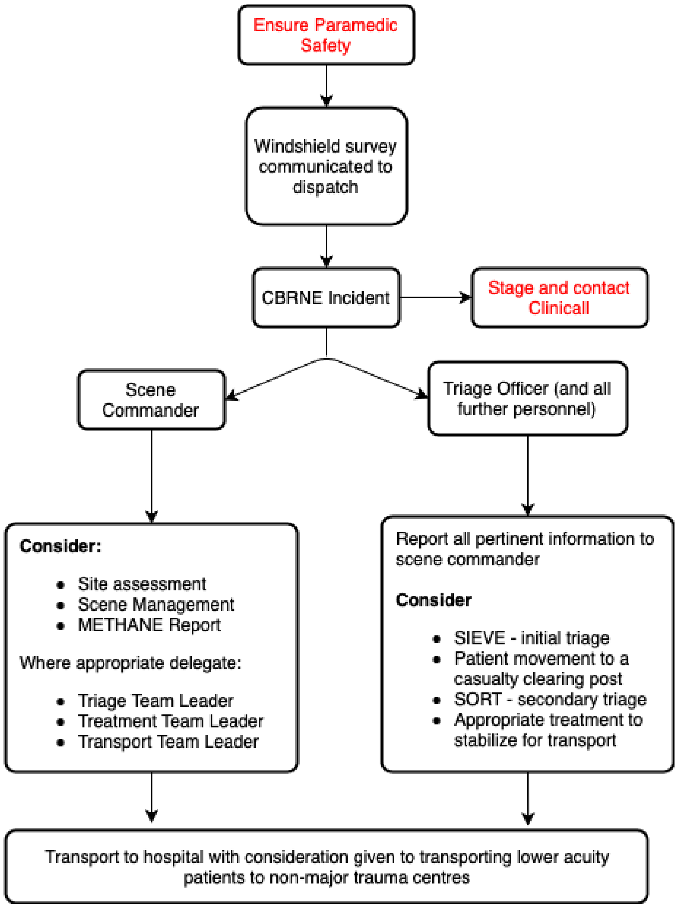
The Prometheus IMT app can help with developing a METHANE report: iOS | Android

- Attendant: The triage officer uses the 'Sieve Triage Process' to facilitate the prioritization of treatment and patient movement from the incident area to the casualty clearing post. A count of patients and their triage priorities are reported back to the scene commander.



During the Sieve Triage Process, a tag is provided to each patient with the relevant priority colour. Patients are then moved from the incident area to the casualty clearing post where patients are assigned to various areas according to their triage priority.

At the casualty clearing post, a secondary triage assessment will reassess the casualty's priority status. This is referred to as the 'Sort Triage Process' and assesses the patient's GCS, respiratory rate, and systolic blood pressure to arrive at a score corresponding to a priority level. Conveyance can begin once enough resources are on scene to manage casualties. Patients are then conveyed from the scene ensuring the right patient is conveyed using the right clinical pathway in the right time frame.



Ensure Paramedic Safety
Windshield survey communicated to dispatch
CBRNE Incident
Stage and contact Clinicall
Scene Commander
Triage Officer (and all further personnel)
Consider:
Site assessment
Scene Management
METHANE Report
Where appropriate delegate:
Triage Team Leader
Treatment Team Leader
Transport Team Leader
Report all pertinent information to scene commander
Consider
SIEVE - initial triage
Patient movement to a casualty clearing post
SORT - secondary triage
Appropriate treatment to stabilize for transport
Transport to hospital with consideration given to transporting lower acuity patients to non-major trauma centres

A06: Documentation Standards

Jennie Helmer
Reviewed: December 2, 2020

Introduction

All BCEHS employees providing out-of-hospital care in British Columbia are required to complete an electronic patient care record (ePCR) for every patient encounter. This document is an important part of the patient's journey. It is the duty of every BCEHS employee to complete patient documentation in a timely, conscientious, and thorough manner. Documentation duties also include recording relevant patient details, findings, management plans, and outcomes in a manner that is clear and understandable to other health care providers. In this context, 'documentation' may also refer to material or data produced outside of the ePCR, including monitor, defibrillator reports, and downloads.

Only one ePCR per patient is provided to the receiving facility. Generally, the most qualified paramedic, or EMR, involved in the patient's care will be responsible for completing the ePCR, and in most cases, this duty will fall to the attending paramedic or EMR. In some circumstances, additional highly trained paramedics will assist in the conveyance of a patient; in this case, the paramedic with the higher level of qualification may contribute content to the ePCR that accompanies the patient.

In cases where care is delegated to lower levels of paramedic or EMR care, the higher qualified paramedic must still complete a separate ePCR documenting their assessment and decisions.

Essentials

- An ePCR must be completed for each request for service, regardless of whether an assessment is conducted, care is provided, or the patient is conveyed by ambulance.
- The ePCR must be completed as soon as possible, no later than the end of the scheduled shift or work assignment during which the call occurred.
- The ePCR documentation must be accurate, legible, and complete.
- In situations where more than one patient is assessed, an ePCR must be completed for each patient.
- Ensure all data entered on the ePCR is correct prior to finalizing the completed form; errors or omissions identified after finalization will require paramedics or EMRs to document the correction in a clearly identified addendum through their unit chiefs or designated supervisors.

General

- The ePCR software contains a number of data collection features that should be used as designed.
- Where an option exists to capture information through a built-in function of the software (e.g., advanced airway data), paramedics and EMRs must use these tools and not rely on free text entry options to record data. This is particularly important when systems of care are involved or where procedures are being performed as the information gathered informs BCEHS practice.
- Corrections to finalized ePCRs must be done through a paramedic or EMR's unit chief or designate.
- Data acquired from cardiac monitors, including cardiac arrest records and 12-lead ECGs, must be downloaded into the ePCR software and attached to the patient care record. This material must also be sent to the Cardiac Arrest and Major Trauma registry when required.
- Automated external defibrillator (AED) case records must be downloaded to the Cardiac Arrest and Major Trauma registry as soon as practical. Instructions for downloading are available.
- When an intervention or treatment has been performed, paramedics and EMRs must ensure that an outcome is described, including complications. These complications should be comprehensively documented for research and follow-up purposes.
- Various groups use the information recorded in the ePCR for a variety of purposes, including:
  - Clinical
    - Information about the call history, patient assessment findings, patient care provided, and the response to treatment, is important to receiving facilities and referral teams to support the patient's ongoing care.
  - Administrative
    - Statistics can assist in maintaining effective paramedic and EMR services and provide valuable information for future planning.
  - Research
    - ePCR information can be used to help answer quality assurance and research oriented questions, which will contribute to future advances in out-of-hospital care and best practice.

- Legal and Regulatory
  - The ePCR is a legal document and is part of the patient's medical record.
  - The report must be complete and of a quality suitable for use as evidence in an investigation or legal proceeding.
  - The ePCR may be requested by external organizations including law enforcement, the Coroner's Office, the Ministry of Health, and the patient.

A07: Oxygen Administration

Neal Carman and Mike Sugimoto

Updated: December 18, 2023
Reviewed: December 18, 2023

Introduction

The administration of oxygen is a fundamental component of paramedic and EMR/FR practice. Although routine, thoughtful consideration is required: paramedics and EMRs/FRs must have a comprehensive understanding of a patient's clinical indications for oxygen administration, and must adhere to current best practices while engaged in any therapeutic activity.

Essentials

- The administration of oxygen should be based on an assessment of overall patient need rather than a formulaic application. Respiratory effort, mentation, oxygen saturation, blood pressure, and clinical scenario all play a role in determining whether oxygen should be given.
- In general, paramedics and EMRs should use the lowest oxygen flow rate possible to achieve an SpO_2 of 94%, or for FRs, until symptoms resolve. This may not be possible for patients who have pre-existing conditions, such as chronic obstructive pulmonary disease; in these cases, titrate to maintain the patient's normal oxygen saturation.
- Do not routinely administer oxygen to patients with normal oxygen saturations where a clearly defined clinical need is lacking.

Additional Treatment Information

- The administration of oxygen should follow a staged approach, where simple, non-invasive options are tried before more aggressive (or invasive) options are explored. Nasal cannula are preferable to face masks, while face masks are preferable to bag-valve masks.
- Recall that adequate oxygenation depends not only on the fraction of inspired oxygen but also on the ability of the patient to ventilate, diffuse gases in the alveoli, and transport oxygen in the blood. Patients require sufficient hemoglobin and an adequate blood pressure to oxygenate effectively.
  - → B01: Airway Management
  - → D01: Shock
  - → D02: Bleeding
- Do not withhold oxygen from patients who are significantly short of breath in order to obtain a room air oxygen saturation. Treat symptomatically to start, and then titrate to bring the oxygen saturation into a normal range.
- For FRs, or in the absence of accurate pulse oximetry in a patient with shortness of breath, administer oxygen until symptoms resolve, or accurate measurements can be obtained.

General Information

- Early, aggressive oxygen administration may be beneficial to critically ill and hemodynamically unstable patients, such as those in cardiac arrest or who require resuscitation. In these cases, paramedics and EMRs should aim to achieve an oxygen saturation of 100%. Once the patient is stabilized, oxygen can then be titrated down to an SpO_2 of ≥ 94%.
- Adverse events from hyper-oxygenation do occur, and sustained hyperoxia has been linked to increases in morbidity and mortality.
- Pulse oximetry may be particularly unreliable in patients with peripheral vascular disease, severe asthma, severe anemia, cold extremities or peripherally hypoperfused, severe hypotension and carbon monoxide poisoning. In the absence of reliable oximetry data, in critical illness, oxygen should be administered.
- Oxygen administration via a BVM should provide a tight seal with the BVM using a 2-person technique where possible.

Interventions

First Responder

- Intervene early; do not wait for signs or symptoms of obvious hypoxia to develop, but act on the potential or suspicion of respiratory insufficiency
- Ventilation is as important as oxygenation; do not withhold BVM ventilations to patients who require ventilatory support

- Maintain a tight seal with the BVM using a 2-person technique where possible
- Patients with mild to moderate shortness of breath (e.g., tachypnea, two-to-three word sentences, obvious wheezing, accessory muscle use):
  - Consider nasal cannula at a maximum flow rate of 5 L/min
- Patients with severe shortness of breath **or** suspicion of critical illness (e.g., anaphylaxis, seizures, shock, traumatic injuries):
  - Consider non-rebreather face mask (NRFM) at 10-15 L/min
  - A nasal cannula may be placed under an NRB or BVM when flow rates above 15 L/min are required
  - Assist ventilations with BVM where required

Emergency Medical Responder – All FR interventions, plus:

- Mild-Moderate Hypoxemia (SpO_2 85-89%):
  - Initial dose of 2-5 L/min via nasal cannula
  - consider face mask 5-10 L/min
- Severe hypoxemia (SpO_2 < 85%) or critical illness:
  - Initial dose of 10-15 L/min via non-rebreather face mask (NRFM)
  - Consider BVM ventilation
  - Once stable, titrate oxygenation to 94%
- Chronic hypoxemia (COPD, cystic fibrosis, obesity, neuromuscular disorders)
  - Titrate SPO_2 88-90%
  - High-flow oxygen may be harmful in these patients; do not neglect the need for ventilation
    - → B05: Chronic Obstructive Pulmonary Disease
- Regardless of SpO_2, treat the following illnesses with high-flow oxygen (15 L/min via NRFM):
  - Toxic inhalation, decompression sickness, cord prolapse, postpartum haemorrhage, shoulder dystocia, and cluster headache
    - → J01: Approach to Toxic Exposures
    - → I03: Dive / SCUBA Injuries
    - → L08: Maternity: Delivery Complications

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Practice Updates

- 2023-12-18: Removed COVID-related changes to guideline (target SpO2 in most cases of 94%).

A08: Interfacility Transfers

Rob Evans

Updated: March 09, 2023
Reviewed: March 01, 2021

Introduction

Interfacility transfers (IFT) are common events that can range from prescheduled conveyances of stable patients to complex, multi-leg transfers of critically ill patients. A common framing bias exists, where transfer events are viewed as lower acuity than out of hospital events. In many cases, patients are being transferred to receive a medically necessary intervention that is not provided at the sending facility. In emergent cases, patients are undergoing transfer to receive a critical intervention at the receiving facility and all efforts should be directed towards achieving that goal in a timely fashion.

Essentials

- Careful planning is key to conducting a successful interfacility transfer, particularly in more complex patients.
- Patients must be positively identified using two separate data points (e.g., name, date of birth, personal health number) prior to being transferred between facilities. Verbal acknowledgement from facility staff alone is insufficient to meet this requirement. See BCEHS Standard Operating Procedure OPS 270.1 for additional information.
- Provide care within the scope of practice for the responsible paramedic or EMR crew.
- In some cases, the sending facility will provide escorts if the patient requires interventions that are beyond the scope of practice of the responding paramedic or EMR crew.
- Ensure escorts (if present) are briefed and that all equipment and personnel are safely restrained prior to conveyance.
- Ensure all lines and tubes are secured prior to patient movement.

Additional Treatment Information

- In patients undergoing air conveyance, package the patient on the appropriate lifting device (generally a Ferno #9 stretcher with a cushion).
- Escalate any questions regarding air conveyance or airport rendezvous to the Critical Care Paramedic Advisor via CliniCall (1-833-829-4099).
- Ensure all equipment and patient belongings are secured safely in accordance with current policy.
- Family escorts may be considered on a case by case basis at the discretion of BCEHS.
- Complete documentation is required for all interfacility transfers.

Referral Information

In general, IFT destinations or clinical pathways will be predetermined through consultation with the sending physician and the Patient Transfer Network (PTN). Any concerns relating to appropriate destination or clinical pathway should be escalated through CliniCall.

General Information

- A number of medications that fall outside paramedic or EMR scope may be either discontinued or have infusions completed prior to transfer.
- This chart lists medications and devices approved by paramedic and EMR level according to the EMALB.

Interventions

First Responder

- Not relevant for this guideline

Emergency Medical Responder – All FR interventions, plus:

- Provide care within scope of practice
- ClinCall consultation required prior to conveyance if there are questions regarding patient care or if the patient meets non-medical conveyance criteria.

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- ClinCall consultation required prior to administration of Schedule 2 interventions in accordance with current BCEHS policy.

A10: Sexual Assault

Lyndsay Kay, Tracy Pickett, Tara Wilkie, Marsha McCall, Tim Lehman, Jennie Helmer, Geoff Ineson, Kevin Barnes, Kaoru Bracewell, Ryan Ackerman, Blanca Scanlon-Sharpe

Updated: April 12, 2023
Reviewed: March 09, 2023

Introduction

Responding to a sexual assault call requires survivor-centered, culturally safe, trauma informed care. Paramedics need to address the physical and psychological trauma while ensuring the sexual assault survivor maintains their autonomy. Many survivors experience continued powerlessness, shame and guilt while accessing services due to insensitive treatment by health service workers. However, when treated with care, compassion, clear explanations and choice, survivors experienced positive associations with health care and can feel "humanized". These positive interactions may be viewed as positive social support, which has been proven to diminish psychological impact of stressful life events.

Best practice for paramedics has been largely adapted from research on sexual assault nurse examiner programs with identified positive outcomes, the World Health Organization's guideline, "Responding to Intimate Partner Violence and Sexual Violence Against Women," and the British Columbia Ministry of Health Trauma-Informed Practice Guide.

Essentials

- Use trauma-informed practice as an assessment structure:
  - Trauma awareness
  - Safety and trust
  - Choice, collaboration, and connection.
- Believe the survivor, and tell the survive you believe them. Fear of not being believed is a major barrier for survivors in accessing care and services, which may have long-term physical and psychological consequences.
- Consider the possibility of sexual assault for any patient who describes a possible drugging, or who is found with a decreased level of consciousness in a precarious situation or abnormal environment (e.g., found with an altered level of consciousness in the bathroom of a bar with missing underwear, or waking up in the bushes in a park with no recollection of antecedent events).
- Ask if the survivor would like to share any information, but be clear that this is not required. Re-telling of stories can be re-traumatizing. Best practices for trauma-informed care minimizes and reduces the number of times a survivor needs to recount what happened. Focus on questions related specifically to patient care.
- Manage physical injuries according to license levels. *Always* request consent prior to touching the patient. Assess for traumatic brain injuries, signs of strangulation, and consider the possibility of human trafficking.
- Preserve items (such as clothing) for forensic evidence if the patient consents. Where possible, have the patient remain in their clothing. Do not place clothing on the floor, and do not cut through deformities in clothing, or wipe off contaminants (including dirt).
- Document all injuries. Record any trigger words (i.e., words that create a reaction in the patient such as wincing, shaking, refusing to speak) found during the assessment, as well as any description of the events shared by the patient.
- If a health authority agreement is in place, transport to a sexual assault receiving facility, or a hospital that has the ability to complete a sexual assault forensic examination. If major trauma criteria are met, follow local trauma guidelines as these supersede the need for sexual assault forensics.
- If no health authority agreement is in place, and a sexual assault receiving hospital is within a reasonable distance, ask the survivor about destination preferences (local hospital versus sexual assault receiving hospital). If the survivor consents to be transported to the sexual assault receiving hospital, confirm the transport destination with the on-duty unit chief. If clinical issues exist, consult with CliniCall for destination selection guidance.

Additional Treatment Information

- Obtain consent before each and any physical interactions with the patient. Patient consent can be given for one interaction but not another, and may be withdrawn at any time.
- External physical injuries may not exist, or may not be apparent. Do not cut and expose clothing unless consent is received, or there is a high suspicion of injury in an unconscious patient.
- Alcohol or drug use is common by perpetrators of sexual assault. (Diphenhydramine and alcohol, gamma hydroxybutyrate (GHB), and rohypnol are examples of substances used.) Paramedics must be aware of drug reactions, and treat these as required.

In cases involving children, the survivor most often knows the perpetrator. Consider the safety of the patient and any other children or vulnerable individuals at the location of the incident. Follow mandatory reporting procedures (Appendix B).

Referral Information

- If the patient refuses to be transported, they should be advised of the location of the sexual assault receiving hospital (or, if more comfortable for the patient, the closest hospital), and options for reporting, including third party reporting. Survivors may be more likely to seek medical attention if accompanied by a support person; this individual can also provide transport in cases of refusal.
- Survivors may be refusing transport because of a fear of a forensic exam. Empower the survivor by reassuring them that they can refuse forensics, and only receive medical care; they are able to change their mind about whether to undergo a forensic exam, or not, at any time.
- If the patient is not being transported, ensure that adequate safety planning has been completed prior to leaving the scene (see appendix C). Refer to VictimLink BC for access to support services.

General Information

Sexual Assault and Consent

Sexual assault is an act of violence. It is defined as any non-consensual sexual contact, as found in the *Criminal Code of Canada*, Section 271. The *Criminal Code of Canada* also notes that consent cannot be given if the individual is intoxicated, drugged, unconscious, asleep, or if they are incapacitated in any way. Consent must freely given, without coercion or threats. Consent can be revoked at any time and can be provided for one act, but not for another.

Trauma Informed Practice and Assessment Structure

Trauma informed practice (TIP) is a framework for understanding the effects of trauma in individuals. It provides physical, emotional, spiritual, and cultural support and safety by giving patients choice and control, allowing them to collaborate in their care planning and treatment. It allows the practitioner to see the patient's reactions as a symptom of a trauma injury, rather than non-compliance or resistance.

Trauma is a psychological and emotional response to a terrible event that overwhelms an individual's ability to cope. Examples include natural disasters, war, major accidents, and rape. One individual's reaction to trauma may be different from another's; some individuals may react expressively, while others may show no reaction at all. Sexual assault survivors may be sobbing and crying, or stoic, or anything in between – there is no "correct" or "right" reaction to trauma.

The re-telling of stories can be re-traumatizing for survivors, causing significant distress. The World Health Organization's guidelines for responding to intimate partner violence, supported by extensive research, includes recommendations to reduce the number of services and providers a survivor has contact to, and where they must recount their story. In taking a clinical history, paramedics with trauma awareness should not press the survivor to tell their story, to exercise patience, and to understand regardless of the survivor's reactions.

Sexual assault survivors

Survivors of sexual assault often experience a range of emotions following their assault. These emotions and feelings vary from individual to individual. Many survivors experience fear, shame, a loss of control, embarrassment, self-doubt, self-blame, grief, and confusion. Helpful words or phrases can include "I believe you," and "this is not your fault." "You are safe now" is also helpful, provided it can be guaranteed that the perpetrator will not have access to the patient.

In the assessment and treatment of sexual assault survivors, cultural safety requires acknowledging and addressing the power imbalances that exist between the practitioner and the patient, the patient and the health care system, and the patient and society. Cultural safety also requires self-reflection on the part of the practitioner, in an effort to identify and challenge personal biases, conscious and unconscious.

Without safety and trust, the patient may not allow paramedics to come close, or to touch them. Safety and trust can be established by ensuring practitioners introduce themselves, and explain their purpose. Paramedics should adapt their environment to help survivors feel safer. This might involve asking the patient if they would like to change locations for the assessment; it can also involve offering the patient a blanket to keep warm, or for protection from the elements. Paramedics should follow the survivor's lead. To continue developing both safety and trust, paramedics must always clearly explain what they would like to do, and seek consent before performing any exam or intervention.

Offering choice and working collaboratively with survivors enhances feelings of safety and trust. Throughout the assessment process, paramedics should give the patient choice, and provide an opportunity to express their views on the types of treatment they might receive, and how it can be delivered. Some survivors will not want any assessment or treatment, wanting only to be taken to hospital. Paramedics must respect the patient's autonomy over their body, and power over what happens in their care – control over the self was lost during the assault, and returning it can promote more safety and trust between paramedic and patient.

This also extends to the ambulance and transport. Patients must be given choices throughout the call. Paramedics must be aware that telling the patient to lie on the stretcher may trigger a negative reaction (the assailant may have told them something similar). Similarly, words or phrases such as "this will be easier if you let me do this" or "stop fighting," or "you are going to the hospital no matter what" are unhelpful – these take away power and control, and mirror the experience of the assault.

Indigenous Survivors

Indigenous people of all genders have a rate of self-reported sexual assault that is nearly three times higher than non-Indigenous Canadians. Indigenous women with a parent who attended a residential school are 2.35 times more likely to be sexually assaulted compared to Indigenous women whose parents did not. Additionally, Indigenous women are specifically at much higher risk of violence, with self-reported rates of sexual assault that ranges from three times higher in the provinces, and six times higher in the territories, compared to their non-Indigenous counterparts. They are also twelve times more likely to be assaulted and suffer serious injuries.

The legacy of colonialism, racism, systemic and societal discrimination, intergenerational trauma, poverty, the continued impact of residential schooling and the 60s scoop, loss of individual and cultural identity, limited educational opportunities, poverty, isolation, and substance abuse all contribute to violence against Indigenous women, and affect the wellness of Indigenous people, their families, and communities. For Indigenous sexual assault survivors, cultural safety is of the utmost importance. Recognizing how these elements influence the survivor's perception of care and treatment will assist paramedics in developing an approach to these patients.

Introduction to Indigenous Health: https://learninghub.phsa.ca/Courses/16926/introduction-to-indigenous-health

Sa̲n'Yas Indigenous Cultural Safety training: https://learninghub.phsa.ca/Courses/11374/sanyas-indigenous-cultural-safety-training-ics-online

Physical Injuries

Survivors of sexual assault may not have immediate or apparent life-threatening injuries, and may only require minimal medical interventions in addition to emotional support and transportation. Paramedics should be aware of the possibility that survivors may have been drugged, strangles, or suffering from traumatic brain injuries; a high index of suspicion should be maintained when patients are disoriented, have disorganized thoughts, or an inconsistent story – though note that this can also be a trauma stress reaction. Traumatic brain injuries are under-recognized in cases of intimate partner violence; some studies cite the incidence of traumatic brain injury at over 90% of individuals with a history of interpersonal violence.

Signs and symptoms of a traumatic brain injury include headaches, nausea and vomiting, blurred vision, and memory problems. Traumatic brain injuries can produce physical, emotional, behavioural, and intellectual changes in patients. See CPG H04 for additional guidance on the management of traumatic brain injuries.

Patients who have been strangled often have symptoms with a delayed onset that can have sever consequences. Strangulation is a form of asphyxia resulting from external pressure on the neck, occluding blood vessels and the airway. Very little pressure on the jugular veins is needed to produce venous outflow obstruction, which leads to congestion of blood vessels, increased cerebral venous pressure, and elevated intracranial pressure. Stagnant hypoxia and cerebral edema can result. Occlusive pressure on the carotid arteries will result in loss of consciousness within 8 to 10 seconds; the obstruction of oxygen delivery to the brain can produce clots. Pressure on the carotid sinus can cause bradycardia, which may lead to cardiac arrest. The tracheal cartilage can also be fractured.

Early signs and symptoms of strangulation include:

- Dysphonia (hoarse voice)
- Dysphagia
- Dyspnea, tachypnea, or feelings of an "asthma attack"
- Sore throat
- Neck or jaw pain
- Lighteheadedness
- Loss of consciousness
- Urinary and fecal incontinence
- Injuries to the lips or tongue
- Nausea and vomiting
- Headache
- Seizure

- Changes to hearing or vision
- Swelling in the neck, scratches or red marks under the chin or around the neck
- Petechiae, particularly around eyelids, the eyes, face, scalp, neck, behind ears, or on the soft palate and under tongue
- Scleral hemorrhage or edema

Later signs and symptoms of strangulation:

- Neck swelling or bruising around neck
- Stroke symptoms (ie. paralysis, slurred speech)
- Memory problems
- Ptosis
- Miscarriage

Strangulation assessment tool for first responders: https://www.familyjusticecenter.org/wp-content/uploads/2018/09/Strangulation-Assessment-Card-v10.12.18.pdf

Forensic Evidence and Reporting

Many sexual assault programs collect forensic evidence samples up to seven days post-assault. Some forensic exams can take place beyond those seven days, depending on circumstances. The collection and documentation of forensic evidence requires continued consent from the survivor. A survivor cannot consent to the forensic collection if they are impaired or incapacitated. While at the hospital, the survivor has three options for care:

1. To receive medical care only.
2. To receive medical care with a forensic exam, with the samples stored where possible. Police reporting does not take place, though the survivor may elect to report later.
3. To receive medical care with a forensic exam, with all evidence and documentation reported to the police.

In all cases, the medical needs of the survivor take priority over the forensic examination and collection of evidence.

Survivors also have three options for police involvement in their case. They may or may not choose to report their assault to police, or they may elect for a third-party reporting (TRP) process, which allows the survivor to remain anonymous while still providing information about the assailant to police. Third party reporting is conducted through community-based victim services; as the survivor's identity will be withheld from police, the Crown will not pursue the assailant in these cases. These reports may be made at any time – there is no time limit to reporting sexual assault.

Documentation

The documentation of any call is an important record of a patient's care. In cases of sexual assault, paramedic (and other health care team) records can be requested and used in legal proceedings. Proper documentation can help the Crown with the laying of charges, and provide valuable evidence at trial.

Paramedics must ensure that notations and records represent objective observations. They should detail the size, location, and type of all injuries (new versus old and healing), any disclosures from the patient, and any "trigger words" and their reactions. Statements made by the survivor must be recorded verbatim.

Human Trafficking

Suvivors of sexual assault may also be victims of human trafficking. Warnings for trafficked patients include:

- Delays in seeking care.
- A person with the patient, often identified as a "friend" or "boyfriend," with controlling behaviour, or who controls the conversation, answers questions for the patient, or acts as the sole interpreter.
- Survivors who change their story of what happened, or who was involved.
- Branding or tattoos on survivors (such as gang symbols or names).
- No BC Services Card or insurance.
- Worries about the cost of care
- Survivors who are uncertain about where they are.
- Individuals who report being homeless, having "just moved," or who are "just visiting."
- Survivors who are not allowed to answer questions.
- Individuals who appear isolated.
- A child or youth who is dressed more provocatively, or who has cash or expensive items that are "gifts" from a friend or boyfriend.

At scenes, be aware of:

- Residences with rooms with multiple mattresses on the floor, or where locks are on the outside of doors.
- Individuals who live in the same place as where they work, sometimes with multiple other people.
- Unsafe or unsuitable living conditions or workplaces.
- Minimal amounts of food considering the total number of residents.
- Children or youth found in hotel rooms.

If human trafficking is suspected, separate the patient from the "friend," "boyfriend," or handler. Move the patient to a safe space, such as the back of the ambulance, and assess using trauma informed practice. Avoid invasive questions; instead, listen to the patient's statements. Many people who are trafficked do not perceive themselves as victims of trafficking. Concentrate on their immediate needs and any health or medical concerns. Transport the patient to hospital without escorts from the scene. If an interpreter is required, use PHSA Language Link, not an on-scene interpreter. Notify the triage nurse of suspicions.

Female Genital Mutilation

Female genital mutilation (FGM) is any procedure that involved the removal or cutting of some, or all, external female genitalia for non-medical purposes. It is practiced in many different cultures and countries, and is usually performed on minors, from infants to girls up to 18 years of age. FGM is internationally recognized as a gender-specific violation of human rights; it can be used to control women and girls' sexuality, or it can be performed due to misinformation about female sexual organs. Regardless of the reason, FGM is fundamentally rooted in gender inequality. Because FGM does not involve sexual contact, it does not qualify as a sexual assault under the *Criminal Code of Canada*; instead, it is considered aggravated assault, under Section 268(3). It is also illegal to send children to another country for the purpose of undergoing an FGM procedure.

The prevalence of FGM in Canada is unknown. The diversity of Canada's population, however, suggests that women and girls from countries where FGM are commonly practiced are living here; some of these women may have already had FGM, and younger girls may be at risk.

Female genital mutilation presents many immediate and long-term physical, psychological, and sexual health issues. Immediate complications include severe pain, hemorrhage, infection, sepsis, shock, and death. Over the longer term, problems include urinary tract infections, child birth complications, menstrual complications, chronic pain, depression, anxiety and low self-esteem.

Interventions

Emergency Medical Responder – All FR interventions, plus:

- Use trauma informed, culturally safe practice throughout patient assessment and management.
- Allow conscious patients autonomy over treatment, position, and disclosure.
- Provide airway management as required.
- Control life-threatening bleeding. For vaginal or anal bleeding, consider use of abdominal pads. Do not throw out gauze or pads used on genitalia – preserve in paper bag (if possible) or wrapped in a blanket or towel for forensic collection.
- Do not clean external wounds unless absolutely necessary; if the patient consents, these may be swabbed for forensic purposes. Covering with dry non-adherent dressings or gauze is acceptable.
- Assess for strangulation injury and traumatic brain injury.
- Assess for signs of human trafficking and sexual exploitation.
- Consider asking patient to defer washroom use until arrival at hospital – urine samples may be collected for forensic purposes.
- Transport to sexual assault receiving or forensic-capable hospital, if available in area. Otherwise, transport to closest hospital.
- Provide notification to hospital to assist in safe placement of patient.
- For pediatrics: notify Ministy of Children and Family Development.
- Document using applicable sexual assault impression code on the ePCR.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider pain management:
  - → E08: Pain Management
- Consider vascular access in cases of significant bleeding.
  - → D03: Vascular Access and Fluid Administration
  - Consider tranexamic acid where indicated
  - See also:

- [→ D01: Shock]
- [→ D02: Bleeding]

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

Caution: consider sedation only in extreme circumstances (if the patient is a risk to themselves or others). Most sexual assault survivors can be calmed through verbal interactions, the provision of safe spaces, promotion of individual autonomy, and transported without medical sedation. Patients may still be emotionally distraught, but this agitation is rarely physical. Sedation can delay options in care, and inhibits the ability to consent to a medical forensic examination and evidence collection.

References

Appendix A: List of SANE Programs or Forensic Hospitals

Vancouver Island Health Authority

- Campbell River General Hospital
- Cowichan District Hospital (Duncan)
- Lady Minto Hospital (Salt Spring Island)
- Nanaimo Regional Hospital
- Port Hardy Hospital
- Tofino General Hospital
- Victoria General Hospital
- West Coast General Hospital (Port Alberni)
- Oceanside Health Centre (Parksville)
- Comox Valley Hospital (Courtenay)
- South Island sexual assault destination guideline and patient pathway

Vancouver Coastal Health Authority

- Vancouver General Hospital
- BC Children’s Hospital
- Vancouver Coastal sexual assault destination guideline and patient pathway

Fraser Health Authority

- Surrey Memorial Hospital
- Abbotsford Regional Hospital

Interior Health Authority

- Kelowna General Hospital
- East Kootenay Regional Hospital (Cranbrook)
- Kootenay Boundary Hospital (Trail)
- Royal Inland Hospital (Kamloops)
- Penticton Regional Hospital
- Queen Victoria Hospital (Revelstoke)
- Vernon Jubilee Hospital

Northern Health Authority

Northwest Facilities

- Northern Haida Gwaii Hospital (Masset-Northen Haida Gwaii)
- Haida Gwaii Medical Centre (Queen Charlotte)
- Stewart Health Centre
- Prince Rupert Regional Hospital

- Mills Memorial Hospital (Terrace)
- Kitimat Hospital & Health Centre
- Wrinch Memorial Hospital (Hazelton)
- Stikine Health Centre (Dease Lake)
- Bulkley Valley District Hospital (Smithers)

Northern Interior Facilities

- Lakes District Hospital & Health Centre (Burns Lake)
- St John Hospital (Vanderhoof)
- Stuart Lake Hospital (Fort St James)
- University Hospital of Northern British Columbia (Prince George)
- GR Baker Hospital (Quesnel)
- Valemount Community Health Centre
- McBride & District Hospital

Northeast Facilities

- Chetwynd General Hospital
- Fort Nelson General Hospital
- Fort St John Hospital
- Dawson Creek Health Unit
- Hudson's Hope Health Centre

Appendix B: Creating a Safety Plan

The purpose of the Safety Plan is to assist the Survivor in being prepared should they decide to leave the potentially unsafe situation they are in. This can be used in situations of known to the Survivor perpetrator of sexual assault, Survivors of intimate partner violence, Survivors of Domestic Violence or any Survivor who fears the perpetrator will come back to their residence.

List Adapted from the Province of British Columbia Ministry of Justice "Creating a Safety Plan" booklet (2015). To see full version, visit: https://www2.gov.bc.ca/assets/gov/law-crime-and-justice/criminal-justice/victims-of-crime/vs-info-for-professionals/training/creating-safety-plan.pdf

- Reassure the Survivor that this is not their fault.
- Encourage the Survivor to develop self-care strategies for their psychological, spiritual and physical wellbeing.
- Ask the Survivor to develop an emergency exit plan, should the perpetrator come through the front door/back door/garage door.
- Ask the Survivor to name people and places they can go that they feel safe and supported. If the Survivor does not have anyone, refer to VictimLink for sources of support and emergency shelters in the area.
- Ensure the Survivor has important cards in their wallet and not stored elsewhere ie. Bank card, credit card, SIN card, driver's license, medical card (and those of their children, if applicable), phone card.
- Ask the Survivor to make photocopies of important documents (ie. Passport, birth certificates, BC ID/ driver's license, Income Assistance documentation, Immigration forms/work permits, etc). Place photocopies in a different place than the originals; hide the originals somewhere safe. Alternatively, scan and email the documents to themselves, as long as the perpetrator does not have access to the Survivor's email.
- Ask the Survivor to prepare a "Go Bag" containing immediate needs in case Survivor needs to leave their home quickly (ie. change of clothes, medications, comfort toy for children, medications, small items of sentimental value).
- If the perpetrator comes back, remind Survivor to call 911 and ask for Police. If the Survivor calls from a landline, the call can be traced so if it is unsafe for the Survivor to speak, 911 can still find the address of the emergency. This is not true for cellphones or satellite phones.

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A11: Care in High Threat Environments

Tim Makrides
Reviewed: December 1, 2020

SAFETY MESSAGE

No BCEHS employee is to intentionally enter a known Hot Zone at ANY time. If one finds themselves within the Hot Zone, they are to immediately find cover and safety, and withdraw to the cold zone as soon as it is safe to do so.

Introduction

A high threat incident is any that involves the potential or actual risk of physical harm to responders as a result of dangers inherent at the scene. This can include the use of firearms or edged weapons, fire, rising floodwaters, or unstable structures to name a few.

While responderss should not knowingly place themselves in areas of high threat, recent events such as the 2014 Ottawa Parliament Hill shooting, 2015 Paris terror attacks, and 2017 London attacks, have shown that first responders may inadvertently find themselves in such a situation. This guideline therefore sets out considerations for safety and clinical care in high threat incidents.

Types of Threats

Threats generally come in two forms, man-made and naturally occurring.

Man-made threats: the Active Armed Offender

The term 'active shooter' makes a direct reference to the use of a firearm or firearms, but an incident may also involve any weapon type such as bladed weapons, explosive devices, and any improvised object capable of inflicting serious injury or death, including vehicle borne intrusions. This is why the term Active Armed Offender (AAO) has been adopted.

These attacks are aimed at people rather than infrastructure and against relatively soft targets. They can occur with little or no planning, intelligence, or forewarning.

While the term 'extremist' is very topical at this time, particularly in the media, it is important to realize that not all AAO incidents are motivated by extremism or perpetrated by religious or ideologically-focused individuals. An AAO incident can also include an individual with a serious fixation and/or a serious mental health issue, motivated by hatred or revenge, or involve criminal intent.

Hybrid Targeted Violence Incident

A Hybrid Targeted Violence Incident (HTVO) refers to the intentional use of force to cause physical injury or death to a specifically identified population using multifaceted conventional weapons and tactics.

This may involve a criminal act, such as the 2017 Bourke Street Mall incident in Melbourne, through to a terrorist incident such as the complex, coordinated 2008 Mumbai attacks.

Naturally Occurring Threats

This could include wildfires where a fire is imminently approaching, rising flood waters or flash floods, avalanches or landslides, earthquakes, or tsunamis.

What is the Current Terrorism Threat Profile in Canada?

'Canada's National Terrorism Threat Levels' is a tool that government officials, including law enforcement agencies, may use to identify risks and vulnerabilities from threats, and in turn, determine what responses may be needed across government to prevent or mitigate a violent act of terrorism in Canada.

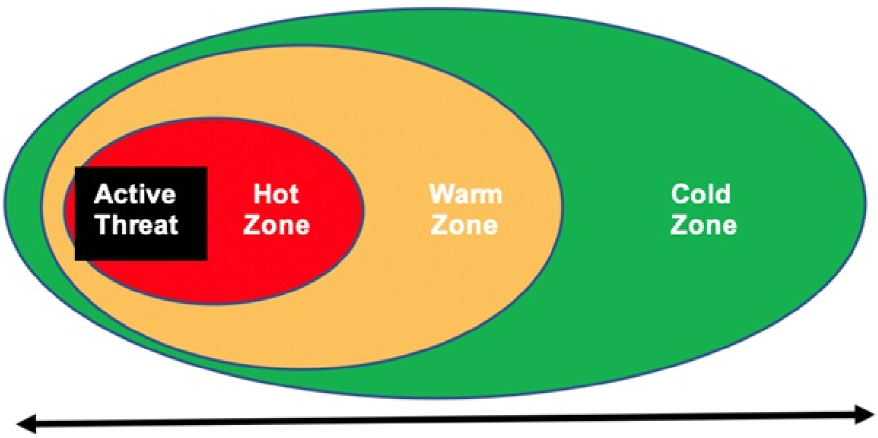
The current threat level can be reviewed here.

What is Tactical Emergency Casualty Care?

Tactical Emergency Casualty Care (TECC) is a set of best practice treatment guidelines for trauma care in the high threat out-of-hospital environment. These guidelines are built upon critical medical lessons learned by military forces over the past 15 years of conflict. They are appropriately modified to address the specific needs of civilian populations (e.g., anticoagulated patients, extremes of age, etc.) as well as injury patterns typically seen in traumatic incidents and adapt these principles to civilian paramedic practice.

At the core of TECC are three distinct zones of care:

- **Hot Zone (Active Threat)** – a dynamic area of operations where there is an active threat of harm (safety risk to patients, bystanders, and emergency response personnel)
- **Warm Zone (Indirect Threat)** – a dynamic area of operations where a potential threat exists, however the threat is no longer considered direct or immediate
- **Cold Zone (No Threat / Area Secure)** – an area of operations where there is no threat present and the scene is considered to be an area of absolute safety



Direction of Threat

It is important to remember that the direction of the threat is dynamic and can change at any time. This is especially relevant in wildfire and terrorism related incidents.

No BCEHS responder is to intentionally enter a known Hot Zone at any time. If a responder finds themselves within a Hot Zone, they are to immediately find cover or safety, and to withdraw to a Cold Zone as soon at it is safe to do so.

Clinical Management of Patients Based on Threat Level

The clinical management of patients and role of all responders is strictly dependant on zones of care. TECC focuses on the treatment during these phases of care and provides guidelines for managing trauma in the civilian tactical or hazardous environment.

Direct Threat Care / Hot Zone Care

- Find cover or safety
- Rapidly apply hemorrhage control with direct pressure or tourniquet
- Beyond consideration of tourniquet application and rolling unconscious patients into the recovery position, no further clinical care should be undertaken while the threat is still present

↓

Indirect Threat Care / Warm Zone Care

- Maintain awareness of potential threat at all times
- Conduct primary survey (C-A-B) with an emphasis on:
  - C: Control external catastrophic hemorrhage with arterial tourniquet or direct pressure
  - A: Consider basic positioning to maintain patent airway, consider OPA/NPA
  - B: Consider chest seal, or bilateral chest decompression (ALS/CCP Only)
- Establish casualty collection point if required

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Evacuation / Cold Zone Care

- Consider other clinical interventions as required
- Consider management for hyperthermia
- Management as per authorized clinical practice guidelines relevant to the patient condition

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Transport to hospital with pre-notification as appropriate

A13: Patient Care Planning for Handover

Jon Deakin, Mike Sugimoto, and Leon Baranowski
Reviewed: March 1, 2021

Introduction

Patient handover often presents as the most critical time in a patient's care journey. At these events, the responsibility for overall patient management and care planning rests with the holder of the highest license level, or most qualified attendant, at the scene. This individual is generally referred to as the most responsible paramedic (MRP), or if an MRP is not on scene, an EMR or FR.

The MRP or EMR/FR is responsible for the development of an appropriate care plan for the patient based upon findings from appropriate investigations and assessments. Where possible, care plans should be developed in collaboration with those who may be receiving handover of the patient. Considerations should include the care required and the scope of practice of the receiving paramedic or EMR. This guideline is intended to provide clarity and advice to paramedics and EMRs/FRs where handover of care may occur.

Essentials

- All patients require deliberately created care plans. A care plan may be as simple as conveying to the hospital with ongoing monitoring, but can also be considerably more complex.
- When considering whether a patient can be handed over to other paramedics or EMRs, the MRP or EMR must consider:
  - The current or future need for interventions.
  - The projected clinical course of the patient.
  - The ability of other providers to provide the care required following delegation.
- Implementation of the care plan is a collaborative process between the MRP or EMR/FR and other paramedics and/or EMRs/FRs at the scene. Delegation of care may only take place with the consent and agreement of the paramedic or EMR assuming care of the patient. The MRP or EMR/FR must provide a complete handover to the receiving paramedic or EMR, discuss ongoing care requirements, and clinical pathway when appropriate. Crews are not obligated to assume care of a patient if they are uncomfortable with the required care or when the care exceeds their scope of practice.
- The MRP or EMR/FR must document their assessment and decisions in the electronic patient care record (or similar), including information regarding the developed care plan. This information must be handed over to the crew accepting the delegated care plan, and the MRP or EMR/FR must ensure the crew understands all relevant elements of the clinical scenario.

General

In general, the MRP may elect to handover care to another paramedic or EMR crew on the basis of three interdependent elements:

1. **Current or future need for interventions.**
   - Ongoing therapies that are limited by scope of practice may not be delegated.
   - Single-dose therapies, such as analgesia for musculoskeletal injuries, or anticholinergic therapy for bronchospasm, that successfully address the patient's needs may be handed over once they have been completely administered, and the MRP is satisfied they are unlikely to produce adverse effects. The MRP must ensure that a reasonable time period has passed following administration of any medication to observe for adverse effects.
   - The MRP remains responsible for the implementation of the care plan for non-therapeutic reasons, including interpersonal dynamics with patients, a perceived need for advocacy, a complex clinical presentation, or a need to conduct ongoing patient assessment.
   - Regardless of the patient's current clinical status, the MRP should not handover care of patients where the provisionally diagnosed condition would generally benefit from their ongoing attendance.
2. **Projected clinical course**
   - Handover should not occur for patients whose clinical condition or associated risks can be reasonably expected to deteriorate at scene or during conveyance.
   - The MRP must not handover patients who can be reasonably expected to require their ongoing attendance during their conveyance time. In this case, "conveyance time" can be defined as the total time between departure from the scene and the transfer of care to hospital staff.
   - The MRP must consider the ability of the other paramedic or EMR crew to utilize established clinical pathways when indicated. Patients who meet the criteria for entry into a specific clinical pathway may require and benefit from the MRP attendance to safely bypass facilities.
3. **Identification of providers able to provide appropriate care.**
   - The MRP must not handover a patient to a paramedic or EMR who is uncomfortable with the patient's presentation or

condition, or who is not able to provide the required care, monitoring, advocacy, or who cannot communicate the pertinent clinical findings to the receiving facility.

- Prior to handing over care, the MRP must be satisfied the receiving paramedic or EMR understands the clinical scenario, the elements of the patient's care plan, and has the ability to manage the patient appropriately.
- Paramedic or EMR crews uncomfortable with receiving handover of the patient must inform the MRP. Resolution of this discomfort is left to the discretion of the MRP and paramedic or EMR crews, however, this resolution must not delay or impact patient care.
- Under no circumstances will the MRP attempt to coerce or intimidate a paramedic or EMR crew into accepting a patient.

When concerns arise involving patient care, crews are encouraged to submit a **PSLS** so that the event can be reviewed and appropriate measures can be taken to mitigate any further events.

B01: Airway Management

Mike Sugimoto

Updated: December 19, 2023
Reviewed: December 18, 2023

Introduction

Airway management sits at the core of effective patient management in out-of-hospital care. In the vast majority of cases, it is the first clinical decision to be made. All patients require a structured airway assessment during their initial evaluation, even those who are not obviously in distress.

The decision to intervene is predicated on a combination of factors. Although the patient's clinical status is the most obvious of these, consideration must be given to crew resource management, training, scopes of practice, and conveyance times. The interplay between these factors can be complex and daunting regardless of the experience of individual paramedics and EMRs/FRs.

Airway intervention decisions can be broken down into three major categories, each of which carries with it a particular level of urgency. The first question revolves around whether there is a need to obtain or maintain an airway – this suggests there is an immediate problem that requires correction, whether that takes the form of a jaw thrust or a pharyngeal airway. The second question considers whether or not there is a problem with oxygenation or ventilation. These types of problems often require rapid intervention, either with supplemental oxygen, a bag-valve mask, or through the use of medications. The third question asks paramedics and EMRs/FRs to consider what the anticipated clinical course is; if patient deterioration is expected, it may be advantageous to intervene earlier, when treatments are more likely to be effective and easier to implement, as opposed to later.

Essentials

- The goal of all airway management is effective and safe **oxygenation** and **ventilation**, regardless of modality or intervention strategy. Effective ventilation depends on sufficient tidal volume and respiratory rate. Effective oxygenation depends on the fraction of inspired oxygen, the capacity for gas to diffuse across the alveolar membrane, the ability (and availability) of haemoglobin to transport oxygen throughout the body, and the propensity of oxygen to diffuse into tissues.
- Because end-organ and tissue perfusion depends on the ability of the body to transport oxygen in the blood, paramedics and EMRs must ensure that patients have a blood pressure sufficient to support life. Volume replacement may be required before airway interventions can take place effectively.
- A thorough and comprehensive respiratory assessment must be performed on all patients. Assessments of airway patency and adequacy of respiration should be performed concurrently with other elements of the primary survey.
- Intervention strategies should progress from simple strategies to more complex approaches and must be based on an understanding of the patient's needs rather than a technical imperative.
- If unable to ventilate despite basic airway maneuvers, consider the presence of an obstructed airway and begin chest compressions.

Additional Treatment Information

Treatments:

- The jaw thrust is the most effective manual maneuver to open an airway when the patient's own muscle tone is lost. In using a jaw thrust, the tongue and epiglottis are lifted away from the posterior oropharynx, maximizing the available space. Pharyngeal airways provide additional assistance at resolving these functional airway obstructions, though a jaw thrust will still need to be maintained even with the adjunct in place to ensure the best possible airway opening. There is no evidence to suggest that a nasopharyngeal airway is better or worse than an oropharyngeal airway; device selection should be based on the presence or absence of gag and airway reflexes.
- Effective bag-valve mask ventilation is a difficult skill to learn and maintain. Optimal bag-valve mask ventilation, in most cases, requires two operators: one to maintain a mask seal and provide a jaw thrust, the other to operate the bag. Lift the patient's face into the mask while providing ventilations. Exposure of the patient's thorax to visualize chest rise and fall is essential; deliver only enough volume to see chest rise and avoid high tidal volumes.
- Critically ill patients can be supported by use of a nasal cannula with a maximum flow rate of 5 L/min in addition to a bag-valve mask (NODESAT or high-flow nasal cannula technique). The inclusion of a PEEP valve in this scenario provides for maximal oxygen delivery in the out-of-hospital environment and allows paramedics to assist ventilations if it becomes necessary.
- When applying CPAP, watch oxygen saturations carefully. Be prepared for a transient fall in oxygen saturation: this is the result of a change in the FiO_2 from a face mask to the CPAP device. Give the device time to work properly before making adjustments. Additional oxygen may become necessary if saturations remain low.

General Information

- A functional airway obstruction occurs when muscle tone in the upper airway is lost and structures collapse under their own weight. The culprits are generally the tongue against the soft palate and the posterior oropharynx, as well as the epiglottis. Functional airway obstructions should be suspected in all patients with an altered level of consciousness and may present as snoring or stertorous respirations, asynchronous chest and abdominal movements, or irregular breathing patterns.
- Be aware of the development of pathological airway obstructions, from infectious diseases, trauma, medication reactions, or anaphylaxis. Options for managing pathological airway obstructions in the out-of-hospital environment are limited - epinephrine (and cricothyrotomy by advanced providers) is generally the only effective choice.
- Carefully consider the interplay between ventilation and oxygenation. Ventilation is the mass movement of gas between the lungs and the atmosphere. Oxygenation is the diffusion of oxygen across the alveolar membrane, the binding of oxygen with hemoglobin for transport to other body tissues, and the subsequent release of that oxygen once it reaches its destination. Both are required to support life, and problems with one can affect the other. Paramedics and EMRs/FRs should remember that they are distinct processes.
- Patients with ventilation deficits do not respond solely to supplemental oxygen. They may require bronchodilation (either with salbutamol or epinephrine, depending on the clinical scenario) or positive pressure ventilation by bag-valve mask. An inadequate respiratory rate, with or without a concurrent fall in tidal volume, requires immediate intervention.
- Hypoxia is the sign of an oxygenation problem. These patients may have adequate ventilation, but are unable to diffuse oxygen across their alveolar membranes (or transport oxygen in the blood). Supplemental oxygen is required in these cases.
- Continuous positive airway pressure (CPAP) masks are not ventilation devices. They are designed to improve the diffusion of oxygen across the alveolar membrane: they will not help patients who do not have an adequate respiratory rate or tidal volume. The specific FiO_2 produced by a CPAP mask is unknown due to the entrainment of ambient air required to generate the positive pressure – when using CPAP, carefully monitor oxygen saturations and adjust flow rates as required. It may be necessary to add oxygen via nasal cannula in critically ill patients.

Interventions

First Responder

- Assess patient and position for optimal access based on clinical need
- Functional airway obstruction present:
  - Perform jaw thrust to open airway
  - Attempt placement of oropharyngeal airway
- Provide optimized bag-valve mask ventilation as necessary
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Monitor and providing ongoing care until arrival of additional resources

Emergency Medical Responder – All FR interventions, plus:

- Functional airway obstruction present:
  - Airway reflexes intact: measure and insert a lubricated nasopharyngeal airway
  - → PR07: Nasopharyngeal Airway
- Airway reflexes absent: measure and insert oropharyngeal airway
- Provide supplemental oxygen as required to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Consider higher level of care intercept where available

Primary Care Paramedic – All FR and EMR interventions, plus:

- Supraglottic airway devices may be used to support oxygenation and ventilation in a staged approach, following confirmation of the ability to ventilate the patient with a bag-valve mask and pharyngeal airway
  - → PR08: Supraglottic Airway
- In non-cardiac arrest situations:
  - If SBP ≥ 90 mmHg and unable to attain $SpO_2 \geq 94\%$, consider use of PEEP

- [→ PR10: Positive End Expiratory Pressure]
- Consider use of CPAP
  - → PR09: Continuous Positive Airway Pressure

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- May consider supraglottic airway device with a viral filter for any obtunded patient
  - → PR08: Supraglottic Airway
- Options for invasive airway intervention in conscious patients:
  - All patients not in cardiac arrest being intubated should receive sufficient volume resuscitation prior to intubation - 500 mL NS or as clinically appropriate
  - Consider awake intubation
  - CliniCall consultation required prior to attempting intubation for patients with perfusing rhythms.
    - → PR23: Awake Intubation
- Consider induction for intubation
  - CliniCall consultation required prior to attempting intubation for patients with perfusing rhythms.
  - → PR18: Anesthesia Induction
  - → PR15: Tracheal Tube Introducer
- Following 2 failed attempts at intubation, attempt placement of supraglottic airway device with a viral filter while preparing for surgical access
  - → PR22: Surgical Airways

NEW: Prospective consultation with CliniCall is required prior to intubating patients with a perfusing rhythm or a palpable pulse. When a prospective consultation is not possible due to clinical or technical factors, a retrospective consultation must still take place as soon as practicable to support paramedic clinical decision-making and airway quality assurance.

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- May consider rapid sequence intubation as required
  - → PR47: Critical Care Anesthesia Planning

Evidence Based Practice

Intubation

Supportive

- Bougie
- Laryngeal Manipulation
- Oxymetry Monitoring
- Securing tube

Neutral

- Direct Laryngoscopy (No airway reflexes)
- Direct Laryngoscopy (with airway reflexes)
- ETI via a SGA device
- Lighted Stylet
- NO DESAT/Nasal apneic oxygenation
- Optical (non-video) Visualization (e.g. Airtraq)
- Video Visualization (e.g. Glidescope)
- Digital Intubation
- Nasotracheal intubation

Against

- Cricoid Pressure

Alternative Rescue Airway Management

Supportive

- BVM
- Laryngeal Tube (without AW reflexes)
- I-Gel
- Laryngeal Tube (with AW reflexes)
- Surgical Cricothyrotomy
- Bougie-assisted Cricothyrotomy
- Pressure manometer

Neutral

- NPA
- OPA
- Pharyngeal Tracheal Lumen (PTL)
- LMA (with AW reflexes)

Against

- Combitube (without AW reflexes)
- LMA (without AW reflexes)
- Percutaneous Cricothyrotomy
- Combitube (with AW reflexes)

Medication for Airway Management

Supportive

- RSI (CCT)
- Sedation
- DSI (CCT)

Neutral

- Topical anaesthetic
- RSA
- Sedation (CCT)

Against

- Rapid Sequence Induction

Airway Confirmation

Supportive

- Quantitative Capnography (with circulation)
- EDD
- Qualitative Capnography (with circulation)

Neutral

- POCUS
- Oxymetry Monitoring
- Qualitative Capnography (no circulation)
- Quantitative Capnography (no circulation)

Against

References

1. Kovacs, et al. Airway Management in Emergencies: The Infinity Edition. 2020. [Link]

Practice Updates

- 2023-12-18: Removed COVID-related restrictions.

B02: Airway Obstruction

Mike Sugimoto

Updated: December 18, 2023
Reviewed: December 18, 2023

Introduction

Airway obstructions are relatively rare, yet life-threatening conditions that require immediate recognition and intervention to avert disaster. Whether they are complete or partial, airway obstructions can result from foreign bodies entering the trachea, pathological conditions that produce a narrowing of the upper airway, or trauma to the mouth, face, head, or neck. The core treatment of an airway obstruction involves attempting to obtain or maintain a patent airway while at the same time identifying and reversing the underlying clinical problem where possible.

This guideline focuses on foreign body airway obstructions (FBAO). Paramedics and EMRs/FRs should refer to other guidelines for the management of croup, epiglottitis, or anaphylaxis as necessary.

- → B04: Croup and Epiglottitis (Stridor)
- → E09: Anaphylaxis

Essentials

- Unconscious patients should have their breathing and circulation assessed concurrently. If the patient is found to be pulseless, immediately begin chest compressions and attach a defibrillator – do not attempt to ventilate these patients prior to beginning CPR. In cardiac arrest, the lack of a patent airway is significantly less important than the need to establish circulation.
- Chest compressions are the core management of a complete FBAO. If in doubt as to the ability to ventilate an unconscious patient, begin chest compressions. The ratio of chest compressions to ventilation attempts is unimportant, but the sequence of actions is: visualize the oropharynx; attempt to remove any foreign body that is seen; attempt to ventilate; then resume chest compressions.
- Consider the use of patient positioning while attempting to manage partial airway obstructions, especially for patients with facial or oral trauma. 'Sit up and lean forward' can be a very useful technique when combined with aggressive suction.
- Partial airway obstructions often require only supportive care and encouragement, although paramedics and EMRs/FRs must be prepared to intervene if the situation deteriorates. However, patients with a partial airway obstruction and signs of poor air exchange – stridor, weak cough, and/or cyanosis – must be treated as a complete airway obstruction.
- Rapid conveyance, with intercept of additional resources and hospital notification, is indicated for persistent airway obstruction, whether partial or complete.

Additional Treatment Information

- Abdominal or chest thrusts are indicated for complete airway obstructions in conscious patients. Use chest thrusts in pregnant or obese patients; these can be performed with the patient supine and are identical to chest compressions in CPR. No evidence exists to support the superiority of chest thrusts over abdominal thrusts (or vice versa) in any population and controversy exists among resuscitation councils as to the effectiveness of back blows in adult populations.
- Back blows may be effective in children under one year of age and should be alternated with chest thrusts as necessary. Children over one year old should be managed with abdominal thrusts.
- When confronted with a patient who cannot be ventilated, advanced providers should begin chest compressions or abdominal thrusts while preparing for both direct laryngoscopy and a surgical airway. Under laryngoscopic visualization, foreign bodies may be removed using Magill forceps – do not attempt to blindly insert forceps into the airway. High vacuum suction, coupled with the Ducanto catheter, may help relieve some airway obstructions.
- Advanced providers should have a low threshold to perform a surgical airway in patients who cannot be ventilated effectively and where the obstruction cannot be visualized and readily removed. The same applies in cases of pathological airway obstruction that cannot be immediately reversed.
- Open cricothyrotomy is contraindicated in children under the age of 12. In these patients, needle cricothyrotomy can be performed instead.

Referral Information

- Paramedics and EMRs/FRs should be aware that abdominal thrusts have the potential to cause significant trauma, including lacerations of internal organs. Patients who received abdominal thrusts, whether from health care providers or lay rescuers, should be conveyed for observation and evaluation.

- Pathological airway obstructions must be conveyed for evaluation and treatment.

General Information

- In adults, eating is the most common precipitating event of a FBAO, with meat being the most likely culprit. Children, by contrast, are more prone to have non-food foreign bodies.
- Submersion or drowning victims do not, as a general rule, experience airway obstructions. The use of abdominal thrusts is not recommended for these patients; the focus should be on the initiation of chest compressions as early as possible for those who are unresponsive and pulseless, with effective bag-valve mask ventilations to address the underlying hypoxia. Patients who are conscious and breathing spontaneously may benefit from CPAP use.

Interventions

First Responder

- Position patient for optimal intervention
- For partial airway obstruction: encourage patient to cough
- For complete airway obstruction **in conscious patients**: begin abdominal thrusts
  - In children under 1 year of age, administer alternating sequences of 5 back blows and 5 chest compressions until the obstruction clears or the patient becomes unconscious
- For complete airway obstruction **in unconscious patients**: begin chest compressions
  - → PR06: High Performance CPR
- Visualize oropharynx prior to every attempt at ventilation and remove foreign bodies if seen; do not attempt blind finger sweeps

Emergency Medical Responder – All FR interventions, plus:

- Initiate conveyance with notification
- Consider intercept with additional resources

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider video or direct laryngoscopy for FBAO removal using Magill forceps, with or without suction
- Consider surgical airway
  - → PR22: Surgical Airways

Evidence Based Practice

Foreign Body Obstruction(Complete/Partial)

Supportive

- Abdominal Thrusts
- Direct Laryngoscopy and Magill forceps
- Oxygen

Neutral

Against

References

1. Panchal AR, et al. Part 3: Adult basic and advanced life support: 2020 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. 2020. [Link]
2. Topjian, AA, et al. Part 4: Pediatric basic and advanced life support: 2020 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care. 2020. [Link]

Practice Updates

- 2023-12-18: Removed COVID-related restrictions.

B03: Asthma and Bronchospasm

Mike Sugimoto

Updated: March 28, 2024
Reviewed: December 18, 2023

Introduction

Bronchospasm is the constriction of the smooth muscles of the bronchi, resulting in narrowing and obstruction of the lower airways. The hallmark of bronchospasm is a cough with generalized wheezing, although in severe cases, there may be little or no air movement and correspondingly limited wheeze. The bronchospasm can inhibit proper ventilation, provoking air trapping, and can also cause an increase in respiratory secretions, leading to mucus plugging and worsening air flow in the lungs. Asthma is a disease marked by frequent and reversible episodes of bronchospasm resulting from characteristic patient-specific triggers.

Essentials

- Bronchodilator therapy is the core treatment for bronchospasm, regardless of the underlying cause. The addition of ipratropium to bronchodilator therapy has been demonstrated to significantly improve clinical outcomes beyond the immediate term. Both salbutamol and ipratropium can be combined in the same nebulizer for co-administration purposes.
- In cases of impending respiratory failure or severe bronchospasm – defined as very poor to no air movement, an inability to speak, a tachypnea > 40/minute (or, paradoxically, a rapidly falling respiratory rate), or a falling level of consciousness – intramuscular epinephrine should be administered to provide rapid bronchodilation.
- Continuous positive airway pressure (CPAP) is available as an option to optimize oxygenation in patients who have already received bronchodilator therapy.
- CPAP should be used with extreme caution. Paramedics will wear airborne PPE when administering CPAP. If possible, CPAP should be discontinued prior to entering the emergency department and resumed when the patient is in an appropriate patient care area (i.e. negative pressure room).

Additional Treatment Information

- Consider the risk of infectious disease exposure when performing interventions that produce aerosols. Nebulized medications should be given with caution to patients with a fever and a history of a respiratory illness. Use appropriate PPE as necessary. Applying a surgical mask over a nebulizer is not an effective reverse isolation technique.
- Bronchospasm is a disease of ventilation. Although the oxygen saturation may be low, this is a result of alveolar hypoventilation and does not necessarily represent a fundamental failure of oxygen uptake or delivery. Do not over-focus on oxygenation to the exclusion of ventilation. Recall that the elimination of carbon dioxide from the body depends on minute ventilation (which is in turn based on tidal volume and respiratory rate). Critical hypercarbia can develop in acute severe asthma; the patient's level of consciousness and respiratory effort must be monitored closely and aggressive action taken to support ventilation if deterioration becomes evident.
- Signs of impending respiratory failure include decreased air entry and respiratory effort, fatigue, decreasing level of consciousness, and declining respiratory rate.
- Salbutamol often provokes coughing and may temporarily worsen audible bronchospasm. Allow the nebulized medication to run its course before making additional treatment decisions unless the patient is deteriorating rapidly. In some cases, continuous nebulizer therapy can be beneficial in optimizing drug delivery to the tissues of the bronchi and should be considered if the patient continues to be significantly short of breath, but able to ventilate effectively, following the initial dose of salbutamol.
- Ipratropium is an anticholinergic agent that reduces airway secretions and acts synergistically with salbutamol as a bronchodilator. Its activity is limited to the lung parenchyma and there is little risk of systemic toxicity. PCP crews are able to convey patients who have received ipratropium, provided the medication has completed its course.
- Epinephrine as an adrenergic agonist can produce dramatic bronchodilation in critically ill patients. Epinephrine should be used preferentially if the cause of the bronchospasm is believed to be anaphylaxis (see anaphylaxis CPG for more details).
- Magnesium sulfate, given intravenously, can produce bronchodilation through relaxation of smooth muscle. Its use should be reserved for patients with acutely exacerbated asthma rather than decompensated chronic obstructive pulmonary disease.
- ***Cardiac arrest considerations***: For all asthmatic patients in cardiac arrest, and especially for patients in whom ventilation is difficult, the possible diagnosis of a tension pneumothorax should be carefully considered and treated with extreme caution.

Referral Information

Refusal of care instructions and guidelines must be followed for patients who decline to be taken to hospital.

General Information

- Signs of acute severe asthma include tachypnea (> 30 breaths/minute), tachycardia, accessory muscle use during inspiration, diaphoresis, the inability to speak in full sentences, and the inability to lie supine. Note that not all patients with severe bronchospasm will exhibit these signs.
- Patients with bronchospasm typically have a prolonged expiratory phase, often 2-3 times longer than their inspiratory phase; this is the result of the effort required to exhale against the constricted airways. In the absence of audible wheezes in a patient who is visibly short of breath, consider the inspiratory-expiratory ratio as an additional piece of information.
- Patients should be asked about their history of disease, with specific focus on previous hospital visits or admissions for asthma, and current prescription drug use (including corticosteroids and bronchodilators). A history of repeated hospital visits for asthma, with or without a concurrent history of increasing bronchodilator use, is predictive for severe disease and places the patient at risk for heightened mortality.

Interventions

First Responder

- Place the patient in a position of comfort, as permitted by clinical condition; in general, this will be a seated position with the patient leaning forward; limit patient movement
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- May retrieve (but not administer) patient MDIs upon request
- Establish ingress and egress routes from the patient’s location
- Communicate patient deterioration to follow-on responders

Emergency Medical Responder – All FR interventions, plus:

- Supplemental oxygen to maintain $SpO_2 \geq 94\%$ (caution: may not be achievable)
  - → A07: Oxygen Administration
- □□ **Requires completion of EMR scope expansion education:**
  - Salbutamol
  - MDI and spacer use is strongly recommended for patients with signs of influenza-like illness, or other infectious respiratory conditions
- Convey early
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Salbutamol
  - MDI and spacer use is strongly recommended for patients with signs of influenza-like illness, or other infectious respiratory conditions
- □□ **Requires completion of PCP scope expansion education or BCEHS Respiratory Assessment course:**
  - Salbutamol with ipratropium (Both salbutamol and ipratropium can be combined in the same nebulizer for co-administration purposes. Note: ipratropium is a single dose administration, while salbutamol may be repeated).
  - For severe disease progressing to imminent respiratory failure: consider intramuscular EPINEPHrine
    - Epinephrine via intramuscular injection should be considered for a patient with $SpO_2 < 90\%$ and moderate to severe symptoms of asthma that are unresolved with the use of salbutamol administered by MDIs
  - CliniCall consultation recommended to discuss care planning options.
  - Consider dexamethasone (Clinical consultation required prior to administration of dexamethasone)
- Consider CPAP
  - → PR09: Continuous Positive Airway Pressure

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Salbutamol and ipratropium
  - Consider repeated salbutamol therapy if limited/no improvement in bronchospasm symptoms

- Consider vascular access
  - → D03: Vascular Access
- Consider intravenous magnesium sulfate
- Consider intravenous or intramuscular EPINEPHrine for impending respiratory arrest; epinephrine via intramuscular injection should be considered for a patient with SpO_2 < 90% and moderate to severe symptoms of asthma that are unresolved with the use of salbutamol
- Consider intubation as required; CliniCall consultation required prior to attempting intubation for patients with perfusing rhythms who are breathing spontaneously.
  - → PR18: Anesthesia Induction
  - → PR23: Awake Intubation

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider use of mechanical ventilation.
  - → PR29: Mechanical ventilation
    - Consider use of non-invasive ventilation
    - Consider invasive ventilation
    - Consider dynamic hyperinflation
      - < 3% of asthmatics develop dynamic hyperinflation. It is almost always due to breath stacking.
      - Consider decreasing breath rate to avoid breath stacking
      - Set PEEP 50-80% of the auto-PEEP
    - Consider I:E 1:3, 1:4
    - Consider reduced driving pressure < 15 cmH_2O
    - Consider permissive hypercapnia
    - Volume ventilation is generally preferred to maintain V_E typically 6-8 ml/kg
    - Consider ABG/VBG sampling to guide therapy
    - Consider radial arterial line placement
    - Consider femoral arterial line placement
- Consider a reduced cabin altitude if conveying by air. (Boyle's law)
- Anesthesia planning
  - Avoid morphine if possible (histamine release)
  - Consider Ketamine
  - Consider Propofol
  - Avoid Etomidate (increased airway resistance and adrenal dysfunction)
  - Consider paralytics
    - Succinlcholine
    - Rocuronium
    - Cisatracurium
- Glucocorticoids
  - Prednisone 40 mg
  - Methylprednisolone 60 mg or (0.5-1 mg/kg q6 hrs to a max of 60 mg/day pediatric)
  - Dexamethasone
- Consider use of empiric antimicrobials (azithromycin).
- Magnesium 2-4g or (25-75 mg/kg to a max of 2g pediatric)
- Call ETP prior to anesthetic gases. Consider anesthetic gas if unable to transport due to severe refractory bronchospasm. This is a temporizing measure until safe transport is possible. Must have an anesthetist capable of using the equipment and medication.
  - Consider sevoflurane or isoflurane. Avoid use of desflurane.
- Consider transport to ECMO center if not already planned.

Evidence Based Practice

Asthma

Supportive

- Anticholinergic
- Beta Agonist-MDI
- Beta Agonist-Nebulized
- Beta Agonist-Parenteral
- Epinephrine-Nebulized
- Hypertonic Saline-Nebulized
- Magnesium Sulfate-IV
- NiPPV
- Steroids-Inhaled
- Steroids-Oral
- Steroids-Parenteral
- Epinephrine- SQ
- Oxymetry Monitoring

Neutral

- Magnesium Sulfate-nebulized
- Steroids-IV
- High flow nasal canula
- Oxygen
- Epinephrine-IV
- Humidified oxygen
- Intubation

Against

Respiratory Distress NYD

Supportive

- NiPPV
- Intubation
- Oxymetry Monitoring
- Transfer of ECMO patients

Neutral

- High flow nasal canula
- Temperature Monitoring

Against

References

1. Fanta CH, et al. Acute exacerbations of asthma in adults: Home and office management. UpToDate. 2021.
2. Wenzel S. et al. Treatment of severe asthma in adolescents and adults. UpToDate. 2021.

Practice Updates

- 2023-09-29: updated EMR and PCP interventions to add salbutamol (EMR) and ipratropium, dexamethasone (PCP)
- 2023-12-18: removed COVID-related restrictions, added information about BCEHS Respiratory Assessment Course

B04: Croup and Epiglottitis

Mike Sugimoto

Updated: January 24, 2024
Reviewed: December 19, 2023

Introduction

Croup and epiglottitis are infectious inflammations of the upper airway. Although adults and children can develop swelling in their upper airways as a result of illness, this inflammation is significantly more pronounced in children because of their inherently smaller airways. Both croup and epiglottitis are serious medical emergencies that require early identification and intervention.

Essentials

- Epiglottitis in children is typically of abrupt onset and is associated with the 'three Ds': drooling; dysphagia; and distressed breathing. Coughing is rare. Classically, children adopt a tripod position and are reluctant to lie down. Adults may complain only of a severe sore throat, fever, and muffled voice. **Do not** attempt to visualize the oropharynx in these cases, unless necessary to control the airway in severely decompensated patients. Because out-of-hospital treatment options are so limited, urgent conveyance to an appropriate facility is of high importance. Do not place these patients in a supine position as doing so may cause respiratory arrest.
- The onset of croup is slower and is generally associated with a prodromal history of viral symptoms (e.g.,fever, cough, nasal congestion, etc). The barking or seal-like cough, with or without inspiratory stridor, is the hallmark of croup. Treatment of croup should be initiated regardless of the degree of stridor, as the inflammation can extend throughout the entire respiratory tract (a condition known as laryngotracheobronchitis).
- An effective treatment for croup in the out-of-hospital setting is nebulized epinephrine. Children who exhibit stridor while at rest should be treated with nebulized epinephrine regardless of whether they demonstrate retractions, agitation, lethargy, or cyanosis. Nebulized epinephrine is not indicated for epiglottitis. Westley Croup Score
- Croup is most prevalent in children between six months and three years of age and is uncommon in those over six years old.
- Paramedics and EMRs/FRs should be aware of the possibility of other causes of upper airway obstruction, including foreign bodies, trauma, and inhalation injuries.

Additional Treatment Information

- Because the inflammation of croup can extend throughout the respiratory tract, compromising ventilation and oxygenation, paramedics and EMRs/FRs must be aware of the potential for sudden deterioration. An early warning sign of deterioration is a fall in oxygen saturation, though supplemental oxygen can artificially prop up SpO_2 limiting the usefulness of this tool. Patients with croup should not be kept on oxygen except as necessary to provide nebulized epinephrine therapy and should be monitored closely for other signs of increasing respiratory distress.
- Although cold or hot humid air can sometimes provide a temporary relief of symptoms for croup, these should not be considered definitive treatments.

General Information

- Epiglottitis is a cellulitis of the epiglottis and surrounding structures caused either by a bacteremia or direct invasion by pathogenic organisms. Bacteria, viruses, and fungi have all been implicated in infectious epiglottitis, though similar symptoms can be seen in cases of trauma, inhalational injury, and airway burns. Although the disease was once commonly seen in children (again, because of the significant differences in airway size), epiglottitis has become comparatively rare due to routine immunization against *Haemophilus influenzae* type B (Hib) as part of routine childhood vaccinations. Risk factors for the development of epiglottitis, in both children and adults, include non-compliance with recommended immunization schedules and immune deficiencies.
- As a general rule, croup is caused by a viral infection and thus, often presents with a history of viral symptoms (e.g., nasal congestion, cough, sore throat, fever). It is important to remember that although the primary manifestation of croup is upper airway stridor, the entirety of the respiratory tract can be inflamed (laryngotracheobronchitis).
- In both croup and epiglottitis, the tissues of the upper airway can act as a one-way valve, allowing exhalation while restricting inspiration. The prolonged inspiratory time can be a helpful tool to differentiate between upper and lower airway inflammation. If mechanical ventilation becomes necessary, higher airway pressures may be necessary to overcome this phenomenon.

Interventions

First Responder

- Provide reassurance and a calming environment
- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition. In general, limit patient movement
- Provide supplemental oxygen where indicated
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient's location
- Communicate patient deterioration to follow-on responders

Emergency Medical Responder – All FR interventions, plus:

- Monitor oxygen saturation and provide supplemental oxygen to maintain an $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Convey early
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- For croup: EPINEPHrine via nebulizer over 15 minutes
  - ClinCall consultation recommended to discuss care planning options.
  - □□ **Requires completion of PCP scope expansion education:**
    - Consider dexamethasone PO, IM IV, IO for significant stridor without marked improvement from inhaled EPINEPHrine
      - ClinCall consultation required prior to administration of dexamethasone

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider need for invasive airway management in severely decompensated patients. Intubation should be reserved for patients in extremis; difficulty should be predicted in these cases.
  - ClinCall consultation required prior to attempting intubation for patients with perfusing rhythms who are breathing spontaneously.
- Consider need for antipyresis
  - Acetaminophen

Evidence Based Practice

Pediatric Stridor

Supportive

- Epinephrine-Nebulized
- Oxygen-Humidified
- Steroids-Oral

Neutral

Against

Practice Updates

- 2023-09-29: added dexamethasone to PCP interventions

- 2023-12-19: removed COVID-related restrictions

B05: Chronic Obstructive Pulmonary Disease

Christine Hudson and Mike Sugimoto

Updated: December 19, 2023
Reviewed: December 19, 2023

Introduction

Chronic obstructive pulmonary disease (COPD) is a progressive, degenerative structural lung disorder that results in impaired ventilation. It is the result of persistent lung irritation from any of a number causes, including but not limited to, smoking, chemical exposure, and repeated infections. It includes progressive lung diseases such as emphysema. Although COPD cannot be cured, it can be managed. Patients with COPD often live with some degree of respiratory distress and frequently seek help during exacerbations of their disease, which are often prompted by respiratory tract infections.

Essentials

- COPD is primarily a disease of ventilation. Treatment should be directed towards improving overall airflow with bronchodilators and steroids.
- Critical hypercarbia can develop in patients with COPD despite high respiratory rates and apparently effective tidal volumes due to changes in the alveoli and pulmonary circulation. Monitor patients closely for signs of impending respiratory failure (a falling level of consciousness, a decreasing respiratory rate, decreasing tidal volumes) and intervene early if necessary.
- Oxygen therapy should be titrated based on what is typical for the patient, where this information is readily available. Although oxygen should never be withheld from patients who are acutely short of breath, its administration should be a considered act with due care and attention. Patients living with COPD are often very aware of their oxygen saturation when not in crisis; they, or their caregivers, can be used as a resource to guide oxygen therapy.
- When patients report a history suggestive of respiratory infections, paramedics and EMRs/FRs must use appropriate personal protective equipment and should avoid all aerosol generating procedures until protective measures are in place.
- Recognize that treatment options for COPD exacerbations in the out-of-hospital environment are limited. Extrication and conveyance should be accomplished as soon as practical and safe. Do not exert patients during movement.

Referral Information

Patients with COPD are at significant risk for recurrent hospital admissions due to exacerbation of their disease.

Community paramedics should refer to the CP COPD guidelines for additional management information.

General Information

- Patients with COPD often have comprehensive management plans prescribed by their care team. These plans reflect an individual's condition and describe a series of actions to be taken based on symptoms. Compliance with the action plan, and response to treatment, should form part of any investigation into an exacerbation of COPD.
- Complete relief of symptoms, including audible wheezes, is frequently not possible. Although paramedics and EMRs/FRs should be aggressive in attempting to relieve dyspnea, therapeutic end points should be set with reference to the patient's normal condition.
- In the absence of patient-specific information, paramedics and EMRs/FRs should consider observable signs that describe the degree of distress. The ratio of inspiratory time to expiratory time is an important clinical clue to the effectiveness of therapy, as is the tidal volume with each breath.
- Paramedics and EMRs/FRs should consider the possibility of concurrent disease processes and seek evidence to include or exclude other diagnoses.
- If a patient continues to deteriorate despite aggressive therapy, consider the possibility of barotrauma and pneumothorax.

Interventions

First Responder

- Minimize patient activity and do not exert patients during movement
- Provide supplemental oxygen as required

- → A07: Oxygen Administration

- Place patient in position of greatest comfort and easiest breathing (generally sitting up)
- Assist patient with retrieval of own inhalers if prescribed
- Begin positive pressure ventilation using bag-valve masks if respiratory failure develops

Emergency Medical Responder – All FR interventions, plus:

- Titrate supplemental oxygen to SpO_2 88-92%
  - → A07: Oxygen Administration
- □□ **Requires completion of EMR scope expansion education:**
  - Salbutamol
    - MDI and spacer use is strongly recommended for patients with signs of influenza-like illness, or other infectious respiratory conditions
- Convey early
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Salbutamol
- □□ **Requires completion of PCP scope expansion education:**
  - Salbutamol and ipratropium
    - MDI and spacer use is strongly recommended for patients with signs of influenza-like illness, or other infectious respiratory conditions
  - Consider dexamethasone (ClinCall consultation required prior to administration of dexamethasone)
- Consider CPAP
  - → PR09: Continuous Positive Airway Pressure

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Salbutamol and ipratropium
- Apply a staged approach to airway and breathing interventions as required
- ClinCall consultation required prior to attempting intubation for patients with perfusing rhythms who are breathing spontaneously.

Community Paramedic (CP) Interventions

- → CP 4.9: Chronic Obstructive Pulmonary Disease

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider use of mechanical ventilation
  - → PR29: Mechanical ventilation
- Consider use of non-invasive ventilation
- Consider invasive ventilation
- Consider dynamic hyperinflation
  - set PEEP 50-80% of the auto-PEEP
  - Consider decreasing breath rate to avoid breath stacking
- Consider I:E 1:3, 1:4
- Consider reduced driving pressure < 15 cmH_2O
- Consider permissive hypercapnia
- Consider ABG/VBG sampling for guidance of therapy.
- Consider radial arterial line placement.
- Consider femoral arterial line placement
- Anesthesia planning
  - Avoid morphine if possible (histamine release)
  - Consider Ketamine
  - Consider Propofol

    - Avoid [Etomidate](#) (increased airway resistance and adrenal dysfunction)
    - Consider paralytics
        - Succinylcholine
        - Rocuronium
        - Cisatracurium
- Glucocorticoids
    - Prednisone 40 mg
    - Methylprednisolone 60 mg
- Antimicrobial
    - antibiotic
    - antiviral
- Magnesium 2-4g
- Call ETP prior to anesthetic gas administration.
- Consider anesthetic gas if unable to transport due to severe refractory bronchospasm. This is a temporizing measure until safe transport is possible. Must have an anesthetist capable of using the equipment and medication.
    - Consider Sevoflurane
    - Avoid Desflurane

Evidence Based Practice

COPD

Supportive

- Beta Agonist-Nebulized
- Beta Agonist-Parenteral
- NiPPV
- Oxygen-titrated
- Beta Agonist-MDI
- Oxymetry Monitoring

Neutral

- Anticholinergic
- High flow nasal canula
- Humidified oxygen
- Intubation

Against

- Oxygen-high flow

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Practice Updates

- 2023-09-29: added salbutamol to EMR interventions; added ipratropium, dexamethasone to PCP interventions
- 2023-12-19: removed COVID-related restrictions

B06: Pulmonary Embolism

Mike Sugimoto

Updated: September 02, 2021
Reviewed:

Introduction

A pulmonary embolism occurs when the pulmonary arterial circulation becomes blocked by material originating elsewhere in the body, either fat, air, or a thrombus. The occlusion causes a variety of symptoms resulting from a combination of poor pulmonary circulation, poor gas exchange and oxygen transport, and right ventricular strain; these can include chest pain, shortness of breath, cough, hypotension, and syncope.

Essentials

- For hemodynamically normal and stable patients with signs and symptoms of a pulmonary embolism, no specific therapies are required beyond monitoring, supplemental oxygen as required, and conveyance to hospital.
- Hemodynamically compromised or otherwise unstable patients require a similar approach, but consideration must be made to the logistics of conveyance and the provision of en route care.
- When conveying a hemodynamically compromised patient with a suspected pulmonary embolism, paramedics and EMRs should plan their conveyance strategy with regards to the need for effective chest compressions should the patient progress to cardiac arrest. Though this may require additional resources, paramedics and EMRs should not wait before initiating conveyance – consider intercept with additional resources en route.
- Patients with a strong suggestion of a pulmonary embolism, and who are in cardiac arrest, should be conveyed as soon as possible with an emphasis on effective chest compressions and early notification to the receiving facility.
- Under most circumstances, paramedics and EMRs/FRs should not cease resuscitation of patients with a suspected pulmonary embolism until contact with CliniCall has been made.

General Information

The severity of symptoms caused by a pulmonary embolism can be extremely variable. Patients can be asymptomatic or near death. Emboli can develop acutely or over a longer term. There can be a clear precipitating event or the origin of the thrombus can be uncertain. As a result, the diagnosis of a pulmonary embolism can be very complex, often subtle, and remains – even with imaging and laboratory tests – one of the most difficult diagnoses in medicine.

In the out-of-hospital environment, the provisional diagnosis of a pulmonary embolism should be reserved for those cases that unequivocally point towards that conclusion – either because of significant history findings, or as a result of clinical presentation. Suspicion will be vastly more common than certainty. Clinical history findings that should prompt the consideration of a pulmonary embolism include:

- Malignancy
- Pregnancy or other hormonal change (e.g., birth control)
- Recent stroke
- Recent hospitalization or restriction of movement
- Recent traumatic spinal cord injury
- Recent joint replacement or other surgical procedure
- Known thrombophilia
- Known venous thromboembolism

Common signs and symptoms of pulmonary embolism can include:

- Sudden onset shortness of breath at rest or on exertion
- Pleuritic chest pain
- Cough
- Orthopnea
- Calf or thigh pain or swelling
- Wheezing
- Syncope

Patients with pulmonary embolisms may present with significant hemodynamic compromise that can progress to cardiac arrest. The possibility of a pulmonary embolism should be entertained when other causes of hemodynamic instability do not adequately account for the patient's presentation. Suspicion should be further raised when the symptoms develop suddenly and without warning.

There is no specific out-of-hospital treatment for a pulmonary embolism. Care is primarily supportive, aimed at optimizing oxygenation and ventilation while supporting blood pressure and ensuring rapid conveyance to hospital.

If a patient with a suspected pulmonary embolism suffers a cardiac arrest, early consultation with both CliniCall and the receiving hospital should be made to discuss a resuscitation and potential reperfusion strategy. Thrombolysis is an option for patients whose cardiac arrests are likely due to embolic events; conveyance should be prioritized, with a focus on ensuring high-quality CPR during patient movement to the maximum extent possible.

Interventions

First Responder

- Provide airway management as required
  - → B01: Airway Management
- In cardiac arrest: begin chest compressions
  - → PR06: High Performance CPR
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen as required to maintain an SpO_2 ≥ 94% (caution: may not be achievable)
  - → A07: Oxygen Administration
- Provide rapid conveyance
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider supraglottic airway for decreased levels of consciousness when unable to ventilate using pharyngeal airways
  - → PR08: Supraglottic Airways

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Intubation as required; avoid intubation strategies that depress blood pressure
  - → PR18: Anesthesia Induction
  - → PR23: Awake Intubation

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Mechanical ventilation
- RV failure can be exacerbated with induction. Follow right heart induction strategies.
  - Avoid high Pplat.
  - Avoid high PEEP
- Hemodynamic support
  - Ultrasound guided (IVCDI, right heart strain, McConnel's sign)
  - IV fluid (potentially harmful in patients with right heart failure)
    - With the right heart failure do not decrease preload.
    - The right ventricle can not compensate with an increase in contractility. It compensates with heart rate due to interventricular coupling. Therefore, allow for tachycardia.
  - Norepinephrine
  - Phenylephrine
  - Epinephrine and Dopamine may exacerbate tachycardia predisposing one to dysrhythmias.
- Call ETP prior to thrombolytics or pulmonary vasodilators. Consider inotropic support with possible pulmonary vasodilator effects.
  - Dobutamine
  - Milrinone

- Anticoagulation consider Wells scoring
  - Heparin
  - Thrombolysis (tPA)

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C01: Acute Coronary Syndrome

Mike Sugimoto

Updated: July 15, 2023
Reviewed: March 01, 2021

Introduction

Acute coronary syndrome (ACS) represents a spectrum of diseases resulting from insufficient blood flow through the coronary arteries culminating in a wide range of presentations.

Essentials

- Rapid identification of ST segment elevation myocardial infarction (STEMI) to facilitate timely reperfusion strategies is the primary goal in out-of-hospital management. Consider ACP intercept for ECG acquisition and interpretation if not available at the scene.
- Antiplatelet therapy should be initiated as early as possible in all patients with suspected coronary ischemia.
- Reduction of myocardial oxygen demand should be accomplished wherever and whenever possible (e.g., management of nausea, pain, and limiting patient exertion).

Additional Treatment Information

- Acetylsalicylic acid (ASA) is the out-of-hospital antiplatelet drug of choice. Emergency medical dispatch will instruct patients to chew and swallow ASA 320 mg and patients may have taken their own prior to paramedic or EMR/FR arrival. Unless otherwise contraindicated, ASA should be administered to bring the total dose, for this event, to at least 160 mg orally.
- Nitroglycerin, 0.4 mg sublingually, may be given to alleviate pain in cases of angina. Systolic blood pressure must be monitored prior to and during nitroglycerin therapy. Nitroglycerin has not been demonstrated to change outcomes in ischemic chest pain and may in fact worsen myocardial ischemia under some circumstances. The on-going use of nitroglycerin in patients who have not experienced symptom relief following the first few doses is unlikely to produce any benefit.
- To minimize handover delays in suspected STEMI and to facilitate angiography and fluoroscopy, place therapy electrodes anterolaterally with wires positioned cephalad (toward the head) prior to initiating conveyance.
- All patients with suspected coronary ischemia should have vascular access established with running intravenous fluid. When selecting a site for access, use of the distal third of the right arm is relatively discouraged (particularly in the setting of anticipated percutaneous coronary intervention). Do not delay conveyance to obtain vascular access.

General Information

- ACS exists on a spectrum, from angina through to STEMI:
  - Angina is pain resulting from a temporary increase in myocardial oxygen demand. This may be the result of reduced blood flow in the coronary arteries due to arterial narrowing, or spasm in the arterial wall.
  - Non-ST segment elevation myocardial infarction (NSTEMI) is the result of an incomplete occlusion of a coronary artery, either by a thrombus alone or in concert with vasospasm. ECGs generally show ST segment depression or T wave inversion, though transient ST segment elevation may also be observed.
  - STEMI occurs when a coronary artery is completely occluded by a thrombus. The diagnosis is dependent on ST segment elevation in two or more anatomically contiguous leads.
- Common presentations include chest pain, "heaviness", or discomfort associated with shortness of breath, nausea, and/or diaphoresis. Be aware that although these are common findings, certain populations – in particular, women, the elderly, those with a history of diabetes, and younger individuals – may present differently. Atypical ACS presentations can include weakness or fatigue, syncope/presyncope, abdominal pain, and nausea.
- The presence of palpable chest wall pain does not exclude ischemic origins. Paramedics and EMRs/FRs should maintain a high suspicion of ischemic-origin pain in cases of chest pain without a clear history of trauma.
- Patients presenting with symptoms consistent with ACS should be managed as such, regardless of ECG findings, up to and including a clinical pathway selection.
- Contraindications to ASA therapy include known hypersensitivity or a recent history of upper or lower gastrointestinal bleeding. Patients on oral anticoagulant therapies are often told by their physician to avoid ASA. In the setting of suspected or known ACS, the antiplatelet activity of ASA is of more importance than the temporary rise in INR. Consult with CliniCall if unsure.

Interventions

First Responder

- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition; in general, limit patient movement
- Provide supplemental oxygen where indicated
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient's location
- Communicate patient deterioration to follow-on responders

Emergency Medical Responder – All FR interventions, plus:

- Oxygen as required to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Acetylsalicylic acid chew and swallow, if not already done
- Nitroglycerin spray if systolic blood pressure ≥ 110 mmHg and heart rate within range of 50-150 beats/minute
  - CliniCall consultation required prior to nitroglycerin administration if no prior prescription or if more than 3 doses are required.
- Consider nitrous oxide as required for pain
  - → E08: Pain Management
- Convey with early notification; consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access with running intravenous fluid
  - → D03: Vascular Access
- Nitroglycerin spray every 4-5 minutes if systolic blood pressure ≥ 110 mmHg and heart rate is between 50-150 beats/minute
  - CliniCall consultation required prior to nitroglycerin administration if no prior prescription or if more than 3 doses are required.
- Consider dimenhyDRINATE for nausea
  - → E07: Nausea and Vomiting
- Obtain and transmit 12-lead ECG.
  - → PR16: 12-Lead ECG
  - The LifePak 15 may be used to acquire a 12-lead ECG if:
    - Paramedics have completed the online and face-to-face training and required EMALB endorsement,
    - The patient is over 18 years of age,
    - The patient presents with active, recent onset (< 12 hours) non-traumatic chest pain that is suspicious for acute coronary syndrome, and
  - Clinical judgment will be required to establish the optimal timing of ECG acquisition. In general, paramedics should minimize scene time wherever possible. Refer to the standard operating procedure for out-of-hospital use of the LifePak 15 for additional information.
- If STEMI criteria are met, and a local PCP STEMI pathway to primary percutaneous coronary intervention has been developed:
  - Request ACP intercept where available.
  - Attach therapy electrodes (place pads anterior-lateral, wires cephalad)
    - Transmit ECG to receiving hospital, and follow the appropriate STEMI pathway provided transport time is **less than 60 minutes**.
      - Kelowna General Hospital Area STEMI Pathway (PCP)
      - Sea to Sky STEMI Pathway (PCP)
      - South Island STEMI pathway (PCP)
- If STEMI criteria are met, and a local PCP STEMI pathway **has not been developed**:
  - Request ACP intercept where available.
  - Notify receiving hospital as soon as practicable.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain and interpret 12-lead ECG (plus additional precordial leads as required)
  - → PR16: 12-Lead ECG
- In cases of STEMI:
  - Select and activate local reperfusion strategy, including early hospital notification
    - Consider eligibility for out-of-hospital reperfusion pathways:
      - → PR51: Prehospital fibrinolysis
- Attach therapy electrodes (place pads anterior-lateral, wires cephalad)
- Consider fentaNYL as required for pain
- Manage dysrhythmias as necessary
  - Atropine as necessary for symptomatic bradycardia
    - → C02: Bradycardia
  - → C03: Narrow Complex Tachycardia
  - → C04: Wide Complex Tachycardia

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

Oxygenation/ Ventilation

(Not routinely used but should be considered for presenting cases of cardiogenic pulmonary edema or cardiogenic shock)

- NIPPV
  - CPAP
  - High-flow oxygen
  - BiPAP
- IPPV
  - Mechanical ventilation

Antiplatelet

- P_2Y_{12}
  - Ticagrelor
  - Clopidogrel
- Consider Gp IIb/IIIa
  - Eptifibatide

Nitrates

- Nitroglycerin IV
- Nitroglycerin Topical

Opioids (recognize the reduction in P_2Y_{12} effectiveness. Routine use should be avoided)

- Morphine
- Fentanyl
- Hydromorphone

Anticoagulants (age and renal function dependant)

- Heparin
- Low molecular weight heparin
  - Enoxaparin
  - Lovenox
  - Fondaparinux

Beta blockade

- Metoprolol
- Atenolol

Consider Calcium channel blocker (patients unable to take Beta blocker)

- Verapamil
- Diltiazem

Statin

- Atorvastatin

ACE inhibitor (administered in the first 24 hours for refractory hypertension)

- Ramipril

ARB

- For patient's intolerant of ACE inhibitors

Consider Fibrinolytic therapy (> 90 minutes to a PCI center)

- Call ETP prior to thrombolytic administration.
- TNK
- tPA
- rPA

Bleeding or anemia

- Consider pRBC's for patients with a Hgb < 100

Hyperglycemia (stress induced in diabetics)

- Consider insulin

Consider correction of electrolytes

- Mg^+
- K^+

Evidence Based Practice

ACS/Suspected Cardiac Origin

Supportive

- 12-Lead ECG
- Anti-platelet (other)
- ASA/Aspirin
- Bypass/Direct to PCI
- Drip and ship
- Fibrinolysis
- Nitrates
- RIC (remote ischemic conditioning)
- Advanced Notice/Cath Lab Activation by EMS
- Pharmacoinvasive approach
- Ketamine
- PAI-ASA

Neutral

- Beta Blockers
- GIK (Glucose-Insulin-Potassium)
- Heparin

- Lidocaine
- Magnesium
- Nitrous Oxide
- HEMS
- Morphine
- Point of Care Troponin

Against

- Fentanyl
- Oxygen-high flow
- Oxygen-titrated

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Practice Updates

15 July 2023: Updated STEMI Clinical Pathway Links for PCP and ACP

C02: Bradycardia

Mike Sugimoto

Updated: July 19, 2021
Reviewed: March 01, 2021

Introduction

While bradycardia is defined as a heart rate of < 50 beats/minute, symptomatic bradycardia refers to weakness, a decreased level of consciousness, shortness of breath, hypotension, or chest pain that is the result of bradycardia. The treatment of bradycardia focuses on optimizing hemodynamics and addressing the underlying cause.

Essentials

- Patients with bradycardia often complain of dizziness, which is frequently exacerbated by positional changes that are resolved when positioned supine, or mild shortness of breath. These patients can be managed with supportive care only, provided they are otherwise asymptomatic.
- Patients with adequate perfusion and a low heart rate may require monitoring and conveyance, but no treatment. Unless the patient requires immediate resuscitation, a conservative approach to management should prevail.
- Clinical end points are defined by the amelioration of symptoms rather than any particular heart rate or blood pressure.
- Management of the prevailing underlying condition is often more critical than correction of the dysrhythmia.

Additional Treatment Information

- Although atropine remains the first-line therapy in adult symptomatic bradycardia, it is unlikely to be effective in 2nd and 3rd degree heart blocks; its use is, however, still recommended in these patients. Atropine is ineffective and potentially harmful in patients who have had a heart transplant.
- Small doses of atropine may produce a transient slowing of the heart rate. In these cases, administer a second dose immediately. For prolonged conveyances, additional atropine may be required to sustain its effect to a maximum total dose of 3 mg.
- Epinephrine infusion should be considered in cases where atropine has failed to produce a meaningful improvement in heart rate or blood pressure.
- Rapid intervention in patients who are peri-arrest (e.g., who have a markedly decreased level of consciousness and signs of profound hypoperfusion) can prevent further deterioration and stave off a progression to cardiac arrest. Epinephrine, rather than atropine, is the preferred pharmacological treatment option in these cases. Note that there is no published data that supports the routine use of epinephrine in preference to atropine for patients not at imminent risk of cardiac arrest.
- Renal failure can precipitate hyperkalemia, which can cause a dangerous accumulation of AV node blocking agents (calcium channel blockers or beta blockers), producing significant bradycardia and hypoperfusion (the so-called 'BRASH syndrome'). This is often triggered by underlying hypovolemia in elderly patients with pre-existing renal dyfunction. Fluid resuscitation and consultation with CliniCall for management of suspected hyperkalemia is required (see ACP interventions below).

General Information

- In all cases of bradycardia, consideration must be given to the overall clinical condition of the patient. Signs of effective perfusion (particularly skin colour, skin temperature, and mentation) are better indicators of the need for intervention than blood pressure (either systolic blood pressure or mean arterial pressure) alone. Paramedics and EMRs/FRs should have a nuanced understanding of the degree to which a patient is symptomatic.
- In all cases of symptomatic bradycardia, search for and address treatable or reversible causes. Such cases may include:
  - Hypoxia (especially in younger patients)
  - Increased parasympathetic (vagal) tone
  - Drug effects or overdoses
  - Hyperkalemia, with or without concurrent metabolic acidosis
  - Myocardial ischemia, particularly if it involves the SA or AV nodes and conduction system
- In the setting of myocardial infarction, bradycardia is often compensatory and somewhat beneficial. Be cautious of initiating rate-specific therapies as these may increase myocardial oxygen demand and extend the margins of infarct. Therapy should be reserved for those patients who are significantly hypotensive.

Interventions

First Responder

- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition; in general, limit patient movement
- Provide supplemental oxygen where indicated
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient’s location
- Communicate patient deterioration to follow-on responders

Emergency Medical Responder – All FR interventions, plus:

- Oxygen as required to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Convey early
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access
  - → D03: Vascular Access
- Consider fluid bolus

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain 12-lead ECG, plus additional precordial leads as required:
  - Manage ischemic findings in accordance with guidelines
    - → PR16: 12-Lead ECG
    - → C01: Acute Coronary Syndrome
- Consider sodium bicarbonate only in cases of suspected hyperkalemia (wide-complex ECG, known renal failure/dialysis patient, diabetic ketoacidosis)
  - → E03: Hyperkalemia
    - ClinCall consultation required prior to treatment for cases of suspected hyperkalemia.
- Atropine to effect
- EPINEPHrine infusion to effect (increase dose every 2-3 minutes)
- Transcutaneous pacing
  - → PR19: Transcutaneous Pacing
  - → PR17: Procedural Sedation
  - → E08: Pain Management
- In peri-arrest scenarios:
  - Consider push-dose EPINEPHrine
  - → N01: Peri-arrest

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Isoproterenol
- Dopamine infusion
- Call ETP prior to transvenous pacing
- Transvenous pacemaker placement/maintenance

Evidence Based Practice

Bradycardia

Supportive

Neutral

- Inotrope
- Anticholinergic
- Transcutaneous Pacing

Against

C03: Narrow Complex Tachycardia

Mike Sugimoto

Updated: July 05, 2023
Reviewed: March 01, 2021

Introduction

The narrow complex tachycardias (NCT) are a number of clinical conditions that are defined primarily by their ECG findings but differ in their significance. All NCTs originate above the level of the atrioventricular node and use the ventricles' normal conduction pathways.

Essentials

- Do not attempt to control heart rate or rhythm, using either medications or cardioversion, if the tachycardia is believed to be compensatory (e.g., pain, hypovolemia, fever, hypoxia). A thorough history must be obtained prior to initiating therapy. Manage any of these major underlying conditions prior to addressing the tachycardia.
- Adenosine is the preferred treatment option for patients experiencing mild to moderate symptoms believed to be associated with a supraventricular tachycardia and whose dysrhythmias cannot be terminated through a modified Valsalva maneuver.
- Electrical cardioversion should be reserved for those patients with severe symptoms or who show signs of significant hemodynamic instability, regardless of the underlying rhythm.

Additional Treatment Information

- Print rhythm strips during all conversion attempts.
- The modified Valsalva (as described by Appelboam et al) has been demonstrated to be effective at terminating paroxysmal supraventricular tachycardia in some settings. It has very few risks and can be used in stable patients while vascular access is being established. The standard Valsalva maneuver is modified by having the patient attempt to bear down, or blow the plunger out of a 10 cc syringe, for 15 seconds. The patient is then laid supine, their legs raised to maximize venous return to the core, and held in this position for 15 seconds.
- Owing to its extremely short half-life, adenosine must be administered rapidly and ideally through a proximal IV site. Patients often complain of a flushing sensation or of a metallic taste in their mouth during adenosine administration. This is normal and to be expected, indicating that an effective dose has been delivered. The monitor should be printing during adenosine administration to record changes to rhythm.
- Patients should, however, be warned of common adenosine side effects prior to administration. These include facial flushing, shortness of breath, palpitations, chest pain, and light headedness. Paramedics must be prepared for rare complications of adenosine, such as bradycardia or prolonged asystole following administration.

General Information

- Atrial fibrillation is the result of electrical activity at multiple ectopic foci in the atria that overwhelm the atrioventricular node and can produce rapid heart rates. The rhythm in atrial fibrillation is irregularly irregular and there are no discernable P-waves on the ECG.
- Atrial flutter is produced by a re-entry circuit within the atria, coupled with an AV node that fails to consistently conduct impulses to the ventricles. Conduction to the ventricles usually follows a 2:1 or 3:1 ratio, which produces a difference between atrial activity and ventricular activity. The rhythm is generally regular, with characteristic 'sawtooth' P-waves on the ECG. Both atrial fibrillation and atrial flutter are associated with structural heart disease as well as age.
- Paroxysmal supraventricular tachycardia (PSVT or SVT) is the result of the development of an accessory conduction pathway between the atria and the ventricles, separate from the AV node. SVT can develop in any individual, at any age, and can be triggered by caffeine or other stimulants, exertion, or – in many cases, nothing at all.
- NCTs may present with chest pain, palpitations, dizziness, pounding in the chest, shortness of breath, or weakness. A history of previous episodes, with similar symptoms, is highly suggestive of a recurrent disease process. Consider a patient with a NCT to be unstable when presenting with:
    - An altered level of consciousness
    - A systolic blood pressure < 80 mmHg
    - Ischemic-type chest pain
    - Significant shortness of breath and/or evidence of acute cardiogenic pulmonary edema.

- The formal diagnosis of NCT, whether atrial fibrillation, atrial flutter, or SVT, often requires prolonged Holter monitoring (at some significant cost to the health care system as the arrhythmias often do not develop during monitoring). Paramedics should therefore endeavour to acquire a high-quality electrocardiogram on all NCT patients, both for their own clinical purposes and also for the patient's benefit as well, particularly if no formal diagnosis has been made.
- In atrial flutter, adenosine may temporarily suppress ventricular activity allowing the flutter waves to be seen more clearly. This is a diagnostic for atrial flutter; adenosine should not, however, be used by paramedics solely as a diagnostic tool.
- Many patients with atrial fibrillation are only mildly symptomatic and require no care beyond monitoring and reassurance. Patients with atrial fibrillation who are symptomatic can be cardioverted; use caution if the onset of the atrial fibrillation is believed to be > 48 hours prior to EMS contact as there is a risk of embolization if the patient is not anticoagulated. Consultation with CliniCall is mandatory in these cases (see ACP interventions below).

Interventions

First Responder

- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition; in general, limit patient movement
- Provide supplemental oxygen where indicated
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient's location
- Communicate patient deterioration to follow-on responders

Emergency Medical Responder – All FR interventions, plus:

- Oxygen as required to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Convey early
- Consider intercept with additional resources

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain and interpret 12-lead ECG with additional precordial leads as required; if significant ischemia is present, manage according to ACS/STEMI guidelines
  - → PR16: 12-Lead ECG
  - → C01: Acute Coronary Syndrome
- Establish vascular access:
  - → D03: Vascular Access
  - If adenosine administration is anticipated, a proximal large-bore (18 g or larger) catheter is preferred
  - Consider fluid bolus if hypovolemia is suspected
- For atrial fibrillation with a rapid ventricular response (> 120/minute):
  - If stable, convey and observe
- For suspected atrial flutter:
  - If stable, convey and observe
- For suspected supraventricular tachycardia:
  - Modified Valsalva maneuver
  - Adenosine - CliniCall consultation required if conversion fails after 2 doses.
    - The use of sedation prior to the administration of adenosine is neither supported by evidence nor recommended by BC Emergency Health Services
- **For all rhythms, if unstable:**
  - Synchronized cardioversion 100-300J (procedural sedation will be required)
    - CliniCall consultation required prior to synchronized cardioversion of atrial fibrillation if onset is believed to be > 48 hours of EMS contact.
  - → PR17: Procedural Sedation
  - → PR20: Synchronized Cardioversion

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider sodium channel blockade
  - May consider procainamide
- Consider beta blockade
  - May consider metoPROLOL
  - May consider Propranolol
  - May consider Esmolol
- Consider potassium channel blockade
  - Amiodarone
- Consider calcium channel blockade
  - May consider diltiazem

Evidence Based Practice

Stable Narrow Complex Tachycardia

Supportive

- Antiarrhythmic - Class I (Na+ channel blockers)
- Antiarrhythmic - Class IV (Ca+ channel blockers)
- Antiarrhythmic - Class V (other mechanism)
- Electrical Cardioversion
- Modified Valsalva
- Treat and Release-SVT

Neutral

- Antiarrhythmic - Class III (K+ channel blockers)
- Beta Blockers
- Carotid Massage
- Valsalva maneuver
- Vagal Maneuvers

Against

Unstable Tachycardia (Wide or Narrow Complex)

Supportive

- Electrical Cardioversion

Neutral

- Vagal Maneuvers

Against

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Practice Updates

- 2023-07-05: removed verapamil from critical care interventions

C04: Wide Complex Tachycardia

Mike Sugimoto

Updated: September 17, 2021
Reviewed: March 01, 2021

Introduction

Wide complex tachycardias (WCT) are characterized by QRS widths greater than 0.12 s on an ECG. They are often, but not always, synonymous with ventricular tachycardia (VT), which is a period of three or more ventricular originated beats at a rate ≥ 100/minute. VT can be either monomorphic or polymorphic in nature.

Essentials

- The objective of care is the rapid termination of life-threatening ventricular tachycardia. Electrical cardioversion is the safest, most reliable mechanism to convert VT into a stable perfusing rhythm.
- Although WCT can develop primarily, it is often a sign of an underlying clinical condition, such as ischemia, hypoxia, hyperkalemia, or increased sympathetic tone. A thorough history should be performed prior to formulating a management plan and any underlying conditions should be considered and addressed concurrently with the tachycardia.
- Consider as unstable any patient with WCT and any of:
  - Altered or rapidly falling level of consciousness
  - Systolic blood pressure < 90 mmHg
  - Ischemic chest pain
  - Significant shortness of breath or signs of cardiogenic pulmonary edema

Additional Treatment Information

- Patients with a WCT who are clinically stable can be managed with supportive care alone. However, these patients can deteriorate quickly, so preparatory measure should be taken (IV access, therapy electrodes placed and attached). For longer conveyance times (> 20 minutes), infusion of amiodarone can be considered in consultation with CliniCall (required; see ACP interventions below).
- Unstable patients should be cardioverted as soon as possible. Sedation will generally be required.
  - Synchronized cardioversion is the preferred choice in monomorphic WCT. Begin at 100J, escalating by 100J increments to a maximum of 360J. If cardioversion fails, consider switching to the alternate pad placement (e.g., if positioned anterior-lateral, place new pads anterior-posterior). Consultation with CliniCall for refractory VT is recommended (see ACP interventions below). When performing a synchronized cardioversion, ensure that the shock button is pressed and held until the energy is delivered.
  - For unstable polymorphic ventricular tachycardia, unsynchronized cardioversion is the preferred choice. Begin at 200J and follow the standard energy escalation protocol.
- Stable polymorphic WCT can be managed with magnesium sulfate. Unstable polymorphic WCT should be defibrillated (unsynchronized cardioversion) beginning at 200J.

General Information

- WCTs are generally regular. Some irregularity can be normal in ventricular tachycardia, but consistently irregular wide complex rhythms should prompt consideration of a rhythm that is atrial in origin, usually atrial fibrillation, in conjunction with a bundle branch block.
  - Note that this must be distinguished from polymorphic WCT or torsades de pointes, where the morphology of each QRS complex is different and the R-R interval continues to change
- A small percentage of regular, WCTs are actually supraventricular in origin and result from an aberrantly conducted electrical impulse. However, the vast majority are, and should be managed as, ventricular tachycardia.

Interventions

First Responder

- Keep the patient warm and protect from further heat loss

- Place the patient in a position of comfort, as permitted by clinical condition; in general, limit patient movement
- Provide supplemental oxygen where indicated
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient's location
- Communicate patient deterioration to follow-on responders
- Monitor patient closely; consider potential for sudden deterioration
- An AED must be ready and available; be prepared to perform chest compressions
  - → PR06: High-performance CPR

Emergency Medical Responder – All FR interventions, plus:

- Supplemental oxygen as required to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Convey early
- Consider intercept with additional resources

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain and interpret 12-lead ECG
  - → PR16: 12-Lead ECG
- Attach therapy electrodes
- Obtain vascular access
  - → D03: Vascular Access
- For stable, monomorphic WCT, or symptomatic runs of WCT:
  - CliniCall consultation required prior to administration of amiodarone.
  - Amiodarone
- For unstable, monomorphic WCT:
  - Sedation and analgesia as required
    - → PR17: Procedural Sedation
  - Synchronized cardioversion, 100-200-300-360J
    - → PR20: Synchronized Cardioversion
  - Consider switching electrical axis if cardioversion fails
  - CliniCall consultation recommended to discuss care planning options for refractory VT.
- For stable, polymorphic WCT:
  - CliniCall consultation required prior to administration of magnesium sulfate.
  - Magnesium sulfate
- For unstable, polymorphic WCT:
  - Sedation and analgesia as required
    - → PR17: Procedural Sedation
  - Defibrillate 200-300-360J

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider sodium channel blockade
  - May consider procainamide
  - May consider lidocaine
- May consider potassium blockade
  - Amiodarone

Evidence Based Practice

Stable Wide Complex Tachycardia

Supportive

- Antiarrhythmic - Class III (K+ channel blockers)
- Antiarrhythmic - Class I (Na+ channel blockers)
- Electrical Cardioversion

Neutral

- Adenosine

Against

Unstable Tachycardia (Wide or Narrow Complex)

Supportive

- Electrical Cardioversion

Neutral

- Vagal Maneuvers

Against

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C05: Acute Aortic Dissection

Richard Armour

Updated: August 18, 2021
Reviewed: March 01, 2021

Introduction

The incidence of acute aortic dissection is reported to be as high as 4.6/100,000 and appears to be increasing. Although infrequent, approximately 80% of patients experiencing an acute aortic dissection will arrive in the emergency department by ambulance. Mortality increases by 2% for every hour of delay in diagnosis, and fully half of all patients die within 3 days of the onset of their symptoms.

Despite the severity of the disease, 1 out of every 6 patients will be misdiagnosed. Acute aortic dissection often masquerades as a number of other conditions, including acute coronary syndrome and stroke. Out-of-hospital care is focused on early recognition, expedient conveyance, analgesia, and judicious resuscitation.

Essentials

- Paramedics and EMRs/FRs must consider acute aortic dissection in any patient experiencing a sudden onset of chest, back, or abdominal pain. Patients commonly describe pain as "sharp" or "tearing" with the maximal intensity at onset. The pain tends to radiate into the back, abdomen, or along the path of the aorta. Up to 17% of patients will not experience pain and will instead present with a decreased level of consciousness, transient syncope, or focal neurological deficits.
- A tear in the aorta can interrupt blood supply to any organ. In patients with pain suggestive of an aortic dissection who also have stroke-like symptoms, such as paralysis, voice hoarseness, or limb ischemia, paramedics and EMRs/FRs should consider the possibility that these symptoms are a result of the dissection.
- Differences in blood pressure between arms are not a consistent indicator of an aortic dissection and must not be used to exclude the diagnosis.

Additional Treatment Information

- Tachycardia can significantly worsen the clinical trajectory of acute aortic dissection. Control of the heart rate is not indicated for paramedics or EMRs/FRs. Every effort must be made to avoid patient exertion during movement.
- Patients with acute aortic dissections may initially present with hypertension. In patients who are hypotensive, fluid resuscitation must be undertaken carefully so as to not exacerbate the dissection. A mean arterial pressure (MAP) of 65 mmHg is sufficient.
- Analgesia should be provided to patients but carefully titrated given the patient's hemodynamic status.

General Information

- An acute aortic dissection occurs when the intima of the aorta tears and blood enters the medial layer of the aortic wall, creating a false lumen.
- Risk factors for aortic dissections include a family history of dissections, hypertension, and/or cardiovascular surgery. Dissections are more common in older males. Individuals with Marfan or Ehler-Danlos Syndrome are at higher risk.
- A new aortic regurgitation murmur, and/or a pulse deficit in the setting of pain suggestive of an aortic dissection, is strongly suggestive of the diagnosis.
- Patients with a widening pulse-pressure are in a critical stage of their disease and paramedics and EMRs/FRs should make preparations for an impending cardiac arrest.
- Acute aortic dissections are described using the Stanford Classification:
  - Type A dissections involve the ascending aorta, with or without the involvement of the arch or descending aorta
  - Type B dissections involve the descending thoracic and/or abdominal aorta
- Do not confuse acute aortic dissection with abdominal aortic aneurysms.

Interventions

First Responder

- Keep the patient warm and protect from further heat loss

- Place the patient in a position of comfort, as permitted by clinical condition; consider supine positioning to optimize blood pressure
  - Warning: do not exert the patient
- Provide supplemental oxygen where indicated
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient's location
- Communicate patient deterioration to follow-on responders

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Convey to appropriate facility with early notification
- Consider analgesia
  - → E08: Pain Management
    - Nitrous oxide

Primary Care Paramedic – All FR and EMR interventions, plus:

- Establish vascular access:
  - Consider fluid bolus if hypotensive and without signs of pulmonary edema
  - Caution: target blood pressure to MAP of 65 mmHg; do not over-resuscitate
  - → D03: Vascular Access
- Consider analgesia
  - → E08: Pain Management

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider analgesia
  - → E08: Pain Management
    - FentaNYL

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider blood pressure lowering agents in cases of confirmed or highly suspected dissection where the patient is hypertensive. Goals are heart rate < 60 beats per minute and a systolic pressure of 100 - 120 mmHg.
  - Consider beta blocker
    - LABETalol
    - Propranolol
    - Esmolol
  - Calcium channel blocker
    - Consider if beta blockers are not tolerated
      - Verapamil
      - Diltiazem
  - Nitrates
    - Beta blockade must be started prior to nitrates to avoid reflex tachycardia.
      - Nitroprusside can be added if target systolic blood pressure cannot be reached with beta-blockers alone.
      - Nitroglycerine

Leaking /ruptured AAA

- This is a surgical emergency. Do not delay transport to a surgical center for any intervention.
- Consider permissive hypotension
- Consider blood product administration
- Avoid intubation due to further decrease in preload when possible.

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C06: Acute Pulmonary Edema

Chris Morgan

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Reviewed: February 09, 2022

Introduction

Pulmonary edema is a clinical phenomenon where fluid accumulates in the alveoli in the lungs, resulting in impaired oxygen exchange and shortness of breath. Although pulmonary edema is associated with a number of clinical problems, in the out-of-hospital environment, it is most commonly the result of congestive heart failure (CHF). Impairment of ventricular function causes blood to accumulate in both the pulmonary and systemic circulation. Pulmonary edema as a result of CHF may develop slowly, over days, or very suddenly (also known as 'flash' pulmonary edema). Treatment options for pulmonary edema depend heavily on underlying cause, so careful assessment is required.

Essentials

- To the maximum extent possible, paramedics and EMRs/FRs should attempt to determine the origin of the fluid and differentiate between cardiogenic pulmonary edema, asthma, pneumonia, or chronic obstructive pulmonary disease.
- Consider cardiogenic shock if the patient: has a history of cardiac dysfunction; is experiencing chest pain with hypotension; has an altered level of consciousness, exhibits pale and cool skin, and/or has a decreased urine output.
- Position patients to limit venous return. Be aware that many patients with pulmonary edema will be unable to tolerate a supine or semi-recumbent position. Respiratory arrest may follow if patients are forced to lie down.
- Patients with impending respiratory failure (e.g., those with a respiratory rate and/or tidal volume that is decreasing and whose level of consciousness is falling) must be ventilated with a bag-valve mask (including a PEEP valve, if indicated).

Additional Treatment Information

- Cardiogenic pulmonary edema is often accompanied by significant hypertension. Nitroglycerin decreases systemic vascular resistance through a number of mechanisms. The decision to use nitroglycerin is complex, requires a thorough understanding of the pathophysiology of the underlying condition, and assesses multiple clinical variables. There are significant risks to the use of nitroglycerin in these cases.
- CPAP is a non-invasive device that uses positive pressure to improve oxygenation and is very effective in cases of pulmonary edema, regardless of the underlying cause. The greatest benefits of CPAP accrue from its use early in the disease course; paramedics should consider the use of CPAP as soon as pulmonary edema has been identified.

General Information

- *Pulmonary edema is not solely caused by congestive heart failure*. Exposure to toxic products (including smoke, bleach, or chlorine) can produce primary pulmonary edema due to epithelial damage. Pulmonary edema can also occur as a result of drug ingestion or submersion and drowning. These patients are generally not hypertensive, do not have a history of heart disease, and have a history of exposure. Although the in-hospital treatment of these patients is different from those with cardiogenic pulmonary edema, the principles remain the same: oxygen, supportive ventilation as required, and rapid conveyance. CPAP can be effective in these cases.
- Early stage pulmonary edema may present as wheezing ('cardiac asthma'). Salbutamol may alleviate some of these symptoms, however, the wheezes in these cases are associated with airway edema rather than bronchospasm. Salbutamol has sympathomimetic properties that increase the workload of an already dysfunctional heart. The risks and benefits of salbumatmol use must be considered for each individual patient.
- Diuretics are no longer considered a mainstay of out-of-hospital treatment for pulmonary edema.
- Some patients with pulmonary edema will require bag-valve mask ventilation, particularly after positional changes. Paramedics and EMRs must be prepared to intervene during or immediately after a transfer and should strive to minimize patient exertion during these maneuvers.
- Patients in respiratory failure, or who otherwise do not improve with CPAP, should be ventilated using a bag-valve mask. The use of positive end-expiratory pressure (PEEP) valves may be effective in improving both oxygenation and ventilation in these patients.

Interventions

First Responder

- Caution: Keep the patient at rest and avoid exertion during transfers. Bring equipment to the patient, including lifting and transfer devices.
- Position patient sitting upright with legs dependent.
- Keep the patient warm and protect from further heat loss
- Provide supplemental oxygen where indicated
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient's location
- Communicate patient deterioration to follow-on responders
- Provide ventilation by bag-valve mask as required; addition of a high-flow nasal cannula may be necessary

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to keep $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Convey early
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider continuous positive airway pressure
  - → PR09: Continuous Positive Airway Pressure
- If positive pressure ventilation by bag-valve mask is required, consider use of PEEP valve (5 cmH_2O to start)
  - → PR10: Positive End Expiratory Pressure

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain vascular access; limit fluid administration to minimum required for drug administration and procedures
  - → D03: Vascular Access
- Obtain and interpret 12-lead ECG; correct and manage abnormalities, including arrhythmia and/or ischemia
  - → PR16: 12 Lead ECG
  - → C01: Acute Coronary Syndrome
  - → C02: Bradycardia
  - → C03: Narrow Complex Tachycardia
  - → C04: Wide Complex Tachycardia
- Consider preload reduction:
  - Nitroglycerin
- Consider salbutamol for significant bronchospasm
- If unable to maintain oxygenation or ventilation through non-invasive methods, consider intubation:
  - → B01: Airway Management
  - → PR18: Anesthesia Induction
  - → PR23: Awake Intubation

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Identify the probable cause of the pulmonary edema
  - Respiratory support is the primary treatment for acute pulmonary edema but this is largely symptom relief. Specific diseases or injuries need to be addressed as the treatments will vary for the presenting clinical picture. (Cardiogenic vs non-cardiogenic)
- → PR27: Mechanical ventilation
  - Consider NPPV
    - High flow
    - BiPAP
    - CPAP

- Consider Invasive ventilation
  - Consider use of ACV or PCV mode, targeting a Vt 6-8 mL/kg
  - Increase PEEP/FiO2 to SpO_2 ≥90% and/or PaO_2 ≥60 mmHg
  - Pplat < 30 cmH_2O
- For persistent hypoxemia, consider (may require neuromuscular blockade):
- Recruitment maneuver
- Open lung ventilation strategy
- Arterial and/or venous blood gas analysis may provide guidance for management

- Hemodynamic support (HFpEF vs HFrEF or non-cardiogenic)
  - Preload reduction
    - Furosemide
    - Fluid restriction
  - Afterload reduction
    - ACE inhibitor or ARB
    - MORPHine
  - Vasopressor support
    - NORepinephrine
    - Vasopressin
    - EpiNEPHrine
    - DOPamine
  - Inotrope support
    - Dobutamine
    - Milrinone
  - Consider albumin for hypoalbuminemia
- Treat the presenting disease/illness.

Evidence Based Practice

Pulmonary Edema (CHF)

Supportive

- NiPPV
- Nitroglycerin-IV
- 12-Lead ECG
- Oxymetry Monitoring

Neutral

- Diuretic
- Ultrasound
- Beta Agonist-MDI
- Beta Agonist-Nebulized
- Nitroglycerin-SL

Against

- Narcotic
- Oxygen

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Practice Updates

2022-02-08: updated language around ACP interventions (reduction of preload)

D01: Shock

Adam Greene and Scott Haig

Updated: July 21, 2021
Reviewed: March 01, 2021

Introduction

Shock is a life-threatening condition of circulatory failure that is defined as a state of cellular and tissue hypoxia resulting from reduced oxygen delivery, increased oxygen consumption, or inadequate oxygen use. Four types of shock are recognized:

- Distributive shock, including: septic shock; neurogenic shock; anaphylactic shock; endocrine shock; toxic shock syndrome; systemic inflammatory response syndrome; and end-stage liver disease.
- Cardiogenic shock, resulting from: myocardial infarction; atrial or ventricular dysrhythmias; and valvular or ventricular septal rupture.
- Hypovolemic shock, due largely to hemorrhagic and nonhemorrhagic fluid losses.
- Obstructive shock, due to: pulmonary embolism; pulmonary hypertension; tension pneumothorax; constrictive pericarditis; and restrictive cardiomyopathy.

These should not, however, be considered exclusive. Many patients with circulatory failure have more than one form of shock. 'Undifferentiated shock' refers to a situation where shock is recognized, but the cause is unclear.

Paramedics and EMRs/FRs should suspect shock when confronted with hypotension, altered mental status, tachypnea, cool and clammy skin, oliguria, and metabolic acidosis (usually from hyperlactatemia). Most of these clinical features are not specific or sensitive for the diagnosis of shock and should be used primarily to narrow the differential diagnosis so that empiric therapies can be delivered in a timely fashion.

Essentials

- Control obvious bleeding in accordance with CPG D02: Bleeding.
- Identify shock states as early as possible.
- Attempt to identify possible causes and types of shock.
- Initiate treatment expeditiously, primarily fluid resuscitation and hemodynamic stabilization.
- Consider CliniCall consultation to discuss treatment plan and/or early conveyance options.

Additional Treatment Information

- Prompt identification of shock state is essential to ensure early and aggressive management of the intended shock state.
- When possible, treatment should include specific correction of the cause of shock.
- Clinicians may consider hemodynamic stabilization primarily through fluid resuscitation and administration of vasoactive agents when appropriate.
- Appropriate and expedient treatment should be based on a good understanding of the possible underlying pathophysiology.

General Information

- The effects of shock are initially reversible but rapidly become irreversible, resulting in multi-organ failure and death.
- Patients who present with undifferentiated shock should have immediate therapy initiated while rapidly identifying the cause and type of shock.
- IV fluids should be used judiciously in cases of suspected cardiogenic shock. Consultation with CliniCall is encouraged in these cases prior to beginning treatment (1-833-829-4099).

Interventions

First Responder

- Control external hemorrhage
  - → PR03: Tourniquets

  - → PR04: Wound packing
- Splint pelvis/fractures, if clinically indicated
  - → PR02: Pelvic Binders
- Position the patient supine to support blood pressure
- Keep the patient warm and protect from further heat loss
- Consider spinal motion restriction where required
- Provide airway management as indicated:
  - → B01: Airway Management
- Provide supplemental oxygen as required:
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identifying documents
- Establish ingress and egress routes from the patient's location
- Communicate patient deterioration to follow-on responders

Emergency Medical Responder – All FR interventions, plus:

- Administer supplemental oxygen to maintain SpO_2 ≥ 94%
  - → A07: Oxygen Administration
- Convey and consider intercept with additional resources
- CliniCall consultation recommended to discuss treatment plan and/or early conveyance options.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access
  - → D03: Vascular Acccess & Fluid Administration
- Consider fluid bolus to correct hypoperfusion or hypotension if clinically indicated
  - CliniCall consultation recommended prior to treatment to discuss care planning options in cases of suspected cardiogenic shock.
  - Consider tranexamic acid in cases of shock secondary to blood loss and hypovolemia secondary to occult bleeding

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider needle thoracostomy
  - → PR21: Needle Thoracentesis
- Consider an appropriate airway adjunct
  - → B01: Airway Management
- Consider EPINEPHrine if refractory to fluid resuscitation
- Consider cardiac arrhythmia
  - → C02: Bradycardia
  - → C03: Narrow Complex Tachycardia
  - → C04: Wide Complex Tachycardia

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Shock differentiation is a hallmark of CCP care. The first thing when dealing with a patient in shock is to differentiate the shock state. Each shock state is specific to the presenting disease or injury pattern. As such each has a specific treatment. The overarching goal is to maintain tissue homeostasis. One of the tools used for differentiation is the use of ultrasound and the RUSH protocol. However this gives a singular data point and needs to be corroborated with history, clinical presentation, and lab data.
- Hypovolemic
  - Is loss of fluid
    - Replace fluid and electrolytes
    - Stop further fluid loss
  - Loss of blood
    - Replace blood with a balanced blood product administration.
    - Stop further blood loss.
- Cardiogenic

  - Arrhythmia
    - Bradyarrhythmias are treated as per ACLS protocols
    - Tachyarrhythmias are treated as per ACLS protocols
  - Cardiomyopathic
    - This is a failure of the muscle to contract properly and eject blood effectively. The most common cause is a STEMI. Regardless of type treat as per ACLS protocols. Determination of Killip class may be helpful.
    - Important to identify right versus left and HFrEF and HFpEF (Heart failure with reduced ejection fraction, Heart failure with preserved ejection fraction)
  - Mechanical
    - This is a failure of the mechanics of the heart. The most common is valvular issues such as regurgitation. Other examples are VSD, PFO, or septal rupture.
- Obstructive
  - Failure to fill
    - Abdominal compartment syndrome, pericardial tamponade, tension pneumothorax, and excessive PEEP are examples that lead to a reduction in blood returning to the ventricle.
    - Treatment consists of removal of the offending pressure.
  - Failure to eject
    - Pulmonary embolism, aortic stenosis, or iatrogenic levels of vasopressor support are examples that restrict the ability of forward blood flow.
    - Remove the offending pressure and support preload, afterload, or contractility.
- Distributive
  - Characterized by the loss of vascular resistance
    - Differentiation can start immediately with a pulse pressure and skin temperature.
    - Further delineation can be identified with heart rate (bradycardia) as in the case of neurogenic.
- Treatments
- Fluid replacement
  - Saline
  - Ringers lactate
  - Plasmalyte
  - Blood products
  - Electrolyte replacement
- Fluid reduction
  - Lasix
- Preload reduction
  - Nitroglycerine
  - Nitroprusside
- Vasopressor
  - Consider Norepinephrine infusion
  - Consider epinephrine infusion
  - Consider vasopressin
  - Consider phenylephrine
  - Consider Dopamine
- Inotrope support
  - Consider Dobutamine
  - Consider Milrinone
- Chronotropic support
  - Consider Isopril
  - Consider Atropine
  - TVP
- Procedural
  - Consider needle/finger/tube thoracostomy
  - Consider pericardiocentesis
  - Consider rapid sequence induction (RSI)

    - Consider thrombolytics such as TNK
    - Consider specialty resource center
- If MAP is unachievable, attempt to maintain signs of end organ perfusion

Evidence Based Practice

Cardiogenic Shock

Supportive

- Bypass/Direct to PCI
- Dopamine
- Norepinephrine
- Epinephrine

Neutral

- Crystalloid Infusion

Against

Hemorrhagic Shock

Supportive

- Plasma infusion
- Restricted Crystalloids
- Tranexamic Acid
- Mechanical Intraosseous Insertion
- Shock Prediction Tool

Neutral

- Colloid Infusion
- Hypertonic Saline
- Trendelenburg
- Blood transfusion
- Manual Intraosseous Insertion

Against

- Aggressive Crystalloids
- MAST
- Pressors

Neurogenic Shock

Supportive

- Aggressive Crystalloids
- Pressors

Neutral

- Colloid Infusion

Against

References

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D02: Bleeding

Adam Greene, Scott Haig, Tom Zajac

Updated: July 19, 2021
Reviewed: March 01, 2021

Introduction

Hemorrhage can result from a number of causes including trauma, medical conditions, or medications that affect the coagulation pathway. In the context of trauma, loss of circulating blood volume from hemorrhage is the most common cause of shock. Hemorrhagic shock is a common and frequently treatable cause of death in injured patients and is second only to traumatic brain injury as the leading cause of death from trauma. Timely recognition, appropriate resources, and appropriate responses are critical for preventing death.

Essentials

- Obtain rapid control of external hemorrhage.
- Control compressible and extremity bleeding with direct pressure.
- Recognize serious occult bleeding.
- Strive to mitigate the lethal triad of trauma (hypothermia, acidosis, and coagulopathy).
- Initiate rapid conveyance to an appropriate lead trauma hospital.

Referral Information

Select clinical pathway in accordance with the Out-of-hospital triage and conveyance guidelines for adult and pediatric major trauma in British Columbia.

General Information

- Assessment and stabilization should follow the CABCDE pattern:
  - Catastrophic hemorrhage
  - Airway
  - Breathing
  - Circulation
  - Disability (neurologic status)
  - Exposure
- The Advanced Trauma Life Support (ATLS) manual produced by the American College of Surgeons describes four classes of hemorrhage to emphasize the early signs of the shock state. Clinicians should note that significant drops in blood pressure are generally not manifested until Class III hemorrhage develops and up to 30% of a patient's blood volume can be lost before this occurs.
  - Class I hemorrhage involves a blood volume loss of up to 15%. The heart rate is minimally elevated or normal and there is no change in blood pressure, pulse pressure, or respiratory rate.
  - Class II hemorrhage occurs when there is a 15-30% blood volume loss and is manifested clinically as tachycardia (heart rate of 100-120 beats/minute), tachypnea (respiratory rate of 20-24 breaths/minute), and a decreased pulse pressure. Systolic blood pressure (SBP) changes may be minimal, if at all. The skin may be cool and clammy, and capillary refill may be delayed. This can be considered moderate hemorrhage.
  - Class III hemorrhage involves a 30-40% blood volume loss, resulting in a significant drop in blood pressure and changes in mental status. Any hypotension (SBP < 90 mmHg) or a drop in blood pressure greater than 20-30% of the measurement at initial presentation is cause for concern. While diminished anxiety or pain may contribute to such a drop, the clinician must assume it is due to hemorrhage until proven otherwise. Heart rate (≥ 120 beats/minute and thready) and respiratory rate are markedly elevated, while urine output is diminished. Capillary refill is delayed. Both class III and class IV should be considered severe hemorrhage.
  - Class IV hemorrhage involves > 40% blood volume loss leading to significant depression in blood pressure and mental status. Most patients in Class IV shock are hypotensive (SBP < 90 mmHg). Pulse pressure is narrowed (≤ 25 mmHg) and tachycardia is marked (> 120 beats/minute). Urine output is minimal or absent. The skin is cold and pale, and capillary refill is delayed.

Interventions

First Responder

- Supplemental oxygen as required
  - → A07: Oxygen Administration
- Apply tourniquets if clinically indicated
  - → PR03: Tourniquets
- Splint pelvis/fractures if clinically indicated and trained
  - → PR02: Pelvic Binders
- Pack wounds if clinically indicated and trained
  - → PR04: Wound Packing
- Position patient based on comfort and tolerance
- Consider spinal motion restriction if clinically indicated
- Apply direct pressure to control external hemorrhage
- Prevent heat loss

Emergency Medical Responder – All FR interventions, plus:

- Activate AutoLaunch/Early Fixed Wing Launch if appropriate

Primary Care Paramedic – All FR and EMR interventions, plus:

- Establish IV access
  - → D03: Vascular Access
- Fluid resuscitation to mentation and/or central pulses:
  - Consider permissive hypotension in select patients; minimize the use of crystalloid
- Tranexamic acid in cases of occult bleeding and/or hypovolemic shock
  - TXA is not indicated for gastrointestinal bleeding
- Provide analgesia as needed
  - → E08: Pain Management

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Advanced assessment techniques including point of care ultrasound (POCUS)
- **If clinically indicated**:
- Large-bore, single-lumen central cordis
  - IO access if unable to obtain IV access
- Balanced blood product resuscitation
  - pRBC
  - FFP
  - Platelets
  - Cryoprecipitate
  - Calcium (CaCL or Calcium Gluconate)
- Reversal of anticoagulation
  - Vitamin K
    - 10 mg IV given over 10 minutes
  - Octaplex
    - Pre-treatment INR: 2 to < 4: Administer 25 units/kg IV; maximum dose: 2,500 units.

      Pre-treatment INR: 4 to 6: Administer 35 units/kg IV; maximum dose: 3,500 units.

      Pre-treatment INR: > 6: Administer 50 units/kg IV; maximum dose: 5,000 units.
  - Protamine sulfate
    - 1 mg of protamine neutralizes 100 units of Heparin slow IV injection 10 minutes to a max of 50 mg.
  - Idarucizumab

        - 5 g IV (administered as 2 separate 2.5 g doses no more than 15 minutes apart).
    - Andexanet alfa
        - Low dose: 400 mg IV bolus administered at a rate of ~30 mg/minute, followed within 2 minutes by an IV infusion of 4 mg/minute for up to 120 minutes.
        - High dose: 800 mg IV bolus administered at a rate of ~30 mg/minute, followed within 2 minutes by an IV infusion of 8 mg/minute for up to 120 minutes.
- Hemodynamic support
    - Fluid resuscitation
        - Ringers or Plasmalyte has been shown to be more beneficial than saline.
        - Consider starting 10-20 ml/kg
    - Vasoconstrictors
        - Does not improve blood flow and may exacerbate bleeding. Fluid resuscitation must be initiated first. Morbidity and mortality is not improved with vasoconstrictor use.
        - Contraindicated for patients with a non-compressible uncontrolled hemorrhage. The exception being with a concomitant TBI.
        - Potentially beneficial for stress volume acquisition as a peri arrest last resort.
        - Phenylephrine
        - Epinephrine
        - Norepinephrine
- Consider balloon tamponade device for variceal hemorrhage.
- Call ETP prior to Blakemore insertion
    - Blakemore
- GI and esophageal bleeding consider
    - Octreotide
    - Pantoloc
    - Vasopressin

Evidence Based Practice

Hemorrhagic Shock

Supportive

- Plasma infusion
- Restricted Crystalloids
- Tranexamic Acid
- Mechanical Intraosseous Insertion
- Shock Prediction Tool

Neutral

- Colloid Infusion
- Hypertonic Saline
- Trendelenburg
- Blood transfusion
- Manual Intraosseous Insertion

Against

- Aggressive Crystalloids
- MAST
- Pressors

Limb Amputation/Mangled/Major Hemorrhage

Supportive

- Hemostatic dressing
- Pre-alert (massive transfusion protocol)
- Tourniquet (limb)

Neutral

- Direct Pressure
- Tourniquet (junctional)

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
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D03: Vascular Access and Fluid Administration

Adam Greene and Mike Sugimoto

Updated: September 29, 2023
Reviewed: September 29, 2023

Introduction

Peripheral venous cannulation, among the most common medical procedures, has revolutionized the practice of medicine. Peripheral intravenous (IV) catheters allow for the safe infusion of medications, hydration fluids, blood products, and nutritional supplements.

Essentials

- Vascular access should only be performed when there is an indication for use in the out-of-hospital environment.
  - See → PR26: Venipuncture - Ethical decision making for more information.
- The need to obtain vascular access should be balanced against other acute clinical needs of the patient. Conveyance of the patient must not be delayed in favor of establishing vascular access.
- Catheter and site selection varies according to the patient's condition and intended use.

General Information

- Initiation of peripheral vascular access is contraindicated when appropriate therapy can be provided through a less invasive route (e.g., intramuscularly, intranasally, or orally).
- Paramedics must make informed decisions with respect to a patient's need for vascular access, with consideration given to:
  - Current clinical status and stability.
  - Expected out-of-hospital interventions, such as the need to administer medications or fluid en route to hospital.
  - Anticipated in-hospital clinical course. Note that a general expectation that the patient may require IV access at some point during their hospital stay is not, by itself, grounds to attempt IV cannulation.
- Intravenous devices can become dislodged or pulled out during patient movement. Paramedics should consider the timing of patient movements when contemplating IV cannulation.
- □□ **FOR PCP: Requires completion of PCP scope expansion education:**
  - Intraosseous access should be considered on critically ill or injured patients who cannot be successfully cannulated in a short period of time.
  - Higher flow rates have been reported when intraosseous needles are placed in the humeral head instead of the tibial plateau. **FOR ACP ONLY:** The humeral head is therefore the preferred site in cardiac arrest.

Interventions

First Responder

Not indicated for this license level

Emergency Medical Responder – All FR interventions, plus:

Not indicated for this license level

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain peripheral vascular access
- Consider need for fluid or fluid replacement if signs or symptoms of hypotension, hypoperfusion, or hypovolemia are present (including based upon history):
  - **In general, give normal saline in 500 mL increments**
    - Target a systolic blood pressure ≥ 90 mmHg
    - **Caution**: major trauma, head, and spinal cord trauma have different fluid resuscitation targets; consult appropriate CPGs for guidance
      - → H01: Principles of Major Trauma
      - → H03: Head Trauma

        - → H05: Spinal Cord Injuries
    - **PCPs may not cannulate children < 12 years of age via any method**
    - CliniCall consultation required prior to initiating intravenous access in children 12-16 years of age.
        - **In children, consider normal saline in increments of 5-10 mL/kg;** **do not exceed 20 mL/kg**

- Reassess patient after every 500 mL bolus for blood pressure and presence or absence of pulmonary edema
- Do not exceed 2 L of fluid
    - CliniCall consultation required if additional fluid administration over 2 L is anticipated.
- ☐☐ **Requires completion of PCP scope expansion education:**
    - Special considerations:
        - For patients in cardiac arrest with suspicion of non-hemorrhagic hypovolemia, consider → PR12: Intraosseous Cannulation (***tibial site*** **only**)
            - **Intraosseous cannulation is prohibited in patients with perfusing rhythms or spontaneous respirations except at the direction of an ACP or higher. Children under 12 years of age may not be cannulated by PCPs under any circumstances.**
            - CliniCall consultation required prior to initiating intraosseous access
            - Intraosseous access is not routinely indicated in cardiac arrest
            - Attempts to obtain intraosseous access must not detract from high-quality chest compressions and cardiac arrest management

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

If unable to obtain peripheral vascular access:

- Consider external jugular access
    - → PR13: External Juglar Cannulation
- Consider intraosseous access
    - → PR12: Intraosseous Cannulation

Community Paramedic (CP) Interventions

→ CP 4.14: Intravenous Initiation by Community Paramedics

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Ultrasound-guided peripheral venous access
- Arterial line placement with or without ultrasound

Evidence Based Practice

Hemorrhagic Shock

Supportive

- Plasma infusion
- Restricted Crystalloids
- Tranexamic Acid
- Mechanical Intraosseous Insertion
- Shock Prediction Tool

Neutral

- Colloid Infusion
- Hypertonic Saline
- Trendelenburg
- Blood transfusion

- [Manual Intraosseous Insertion]

Against

- [Aggressive Crystalloids]
- [MAST]
- [Pressors]

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1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
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Practice Updates

- 2023-09-29: added intraosseous cannulation to PCP interventions

E01: Hypoglycemia and Hyperglycemia

Sheena Osborne

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Reviewed: September 29, 2023

Introduction

Diabetes mellitus (DM) is a common disease affecting the endocrine system. DM can be classified into Type 1, Type 2, and gestational diabetes. These diseases produce complications that are commonly encountered in the out-of-hospital environment, including hypoglycemia, hyperglycemia, diabetic ketoacidosis (DKA), and hyperosmolar hyperglycemic state (HHS). Disruptions in blood glucose levels are the hallmark of all diabetic emergencies. A typical blood glucose (BG) level is 4.0-7.0 mmol/L and may be slightly higher after meals. A blood glucose measurement < 4.0 mmol/L is considered hypoglycemia and should be corrected.

The goals of care include early recognition of abnormal blood glucose levels, followed by the immediate correction of hypoglycemia. Paramedics and EMRs/FRs should investigate the underlying cause of hypoglycemia and treat concurrent illnesses. Patients with hyperglycemia, diabetic ketoacidosis, or HHS require immediate conveyance and supportive care, often including fluid replacement.

Essentials

- Early recognition of abnormal BG levels and identification of underlying pathologies.
- Hypoglycemic patients who are able to swallow and follow commands should be given oral glucose preferentially.
- Hypoglycemic patients who are unable to follow commands should receive intravenous dextrose or intramuscular glucagon.
- Hyperglycemic patients, and those with suspected diabetic ketoacidosis or HHS, should be conveyed urgently and evaluated for possible fluid replacement.

Additional Treatment Information

- Diabetic emergencies often involve an alteration in a patient's level of consciousness. Ensure the airway is patent and manage as required.
- Patients experiencing an episode of hypoglycemia who are able to follow directions can be encouraged to eat long-acting carbohydrates (e.g., a sandwich or fruit) when available. This provides a more sustained correction of blood glucose and may be preferred over other interventions, provided paramedics or EMRs/FRs do not suspect any other underlying problems (such as infection).
- Blood glucose levels should be retested to measure the effectiveness of treatment and to confirm adequate reversal of hypoglycemia.
- During IV administration of dextrose solutions, ensure IV is patent as extravasation causes tissue necrosis.
- Fluid therapy may be necessary during diabetic emergencies. Assess for signs of dehydration and provide IV fluid if required. Patients in hyperglycemic states often become dehydrated; diabetic ketoacidosis and HHS can cause profound hypotension.
- Paramedics and EMRs/FRs must consider other causes of altered levels of consciousness, particularly in those patients whose blood glucose levels have been corrected but remain obtunded.

Referral Information

Adult patients who experience an explained hypoglycemic episode that is fully resolved may wish to decline conveyance. Patients who elect to not be conveyed must:

- Not have a concurrent acute illness
- Not have suffered a drug overdose, nor consumed excessive alcohol
- Not be taking oral hypoglycemic medications
- Not have experienced another hypoglycemic episode requiring treatment within the past 24 hours
- Not have any abnormal vital signs, including blood pressure and decreased Glasgow Coma Scale
- Not be febrile
- Have fully recovered from their hypoglycemic episode with a return to normal mentation; post-recovery blood glucose shall be ≥ 4.0 mmol/L
- Be attended to by a responsible adult who will stay with the patient for at least 4 hours
- Have completed the appropriate waivers and demonstrated, to the paramedic or EMR's satisfaction, that they understand the

recommendations for follow-up care

General Information

- Causes of hypoglycemia (< 4.0 mmol/L) include: missed meals; an overdose of insulin or oral hypoglycemic agent; recent changes in medications; higher than normal amounts of physical activity; underlying illess (particularly infections); alcohol consumption; or other physiological stressors.
- Signs and symptoms of hyperglycemia include: thirst and polydipsia; polyphagia; polyuria; blurred vision; dehydration; and nausea.
- Common causes of hyperglycemia include: infection; medication changes or mismanagement; changes in diet; increased emotional stress; or a reduction in physical activity. Hyperglycemia is sometimes the initial finding prior to a diagnosis of diabetes.
- DKA is a life-threatening emergency primarily affecting Type 1 diabetics. It may represent a first-time presentation of diabetes; 25% of patients who present with DKA have no prior diagnosis of diabetes.
  - It is typically the result of an insulin deficiency and a surge in counter-regulatory hormones and can be trigged by a variety of causes. DKA results in hyperglycemia, ketosis from fatty acid breakdown, dehydration, metabolic acidosis, and electrolyte disturbances. Patients commonly present with altered levels of consciousness, nausea and vomiting, an elevated blood glucose level, abdominal pain, and a 'fruity' or ketone odor on their breath.
  - The increase in ketone body production causes a metabolic acidosis, which in turn drives compensatory hyperventilation (Kussmaul's respirations). This ventilatory rate is intended to lower $PaCO_2$ and counteract the decrease in pH.
- HHS, formerly known as hyperosmolar hyperglycemic nonketotic coma, is similar to DKA, though it is more common in Type 2 diabetics. Patients experience an extreme elevation in blood glucose and significant dehydration, but do not experience the same acidosis and ketosis as would be seen in DKA.
- Gestational diabetes has a similar pathogensis as Type 2 diabetes and is the cause of glucose intolerance in pregnancy. It can be managed in the same way as diabetes mellitus and affects approximately 7% of pregnancies.

Interventions

First Responder

- Position patient in lateral position if unconscious
- Evaluate for stroke signs and symptoms
- Assess and maintain airway patency
  - → B01: Airway Management
- Provide supplemental oxygen therapy as required
  - → A07: Oxygen Administration
- Correct suspected hypoglycemia
  - For patients with sufficient mentation to maintain an airway, apply glucose gel to oral mucosa
    - Oral 40% Glucose Gel
  - For patients with insufficient mentation or an unprotected airway
    - Glucagon

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen therapy in patients with clinical signs of hypoxemia or to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Correct suspected hypoglycemia
  - For patients with sufficient mentation to maintain an airway, apply glucose gel to oral mucosa
    - Oral 40% Glucose Gel
  - □□ **Requires completion of EMR scope expansion education:**
    - Glucagon
- Provide safe and expeditious conveyance
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access

- → D03: Vascular Access

- Correct confirmed hypoglycemia:
  - 10% dextrose in water (D10W) IV: 10 to 25 g (100-250 mL)
  - Glucagon if unable to obtain IV access
- Correct hypotension; target systolic blood pressure of 90 mmHg

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- If suspected DKA/HHS:
  - Obtain and interpret 12-lead ECG
    - → PR16: 12-Lead ECG
- Perform continuous cardiac monitoring en route to hospital; electrolyte disturbances may produce arrhythmias
- Exercise caution in DKA when performing advanced airway procedures: tachypnea is the main compensatory mechanism to control acidosis; if intubation is required, select a higher than normal ventilatory rate (use patient's intrinsic rate as a guide)

Community Paramedic (CP) Interventions

CPG CP4.7: Diabetic Follow-up

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Pediatric DKA/HHS follow BC Children's Hospital protocol
- Hypoglycemia
  - Consider Thiamine
- DKA/HHS

1. Replace fluid loss
   - Shock isotonic fluid as quickly as possible.
   - Hypovolemic without shock 15-20ml/kg/hr
   - Euvolemic infused slower guided by clinical assessment.
   - Corrected sodium less than 135 mEq/L continue saline 250-500ml/hr approximately.
   - Normal or elevated corrected sodium switch to one-half saline at 250-500 ml/hr
2. Potassium correction
   - Potassium less than 3.3 mEq/L start KCL 20-40 mEq/hr
   - Potassium between 3.3-5.3 mEq/L KCL 20-30 mEq to maintain the range of 4-5 mEq/L.
   - Potassium greater than 5.3 mEq/L then delay potassium replacement.
3. Insulin infusion
   - Delay insulin if potassium is less than 3.3 mEq/L.
   - Insulin R IV bolus 0.1U/kg followed by 0.1U/kg/hr
   - If glucose is not decreasing after 1 hour and there is no inline filter or extravasation. The insulin infusion may be doubled.
   - When serum glucose approaches 11.1 mmol/L in DKA or 13.9-16.7 in HHS switch saline to D5W and decrease the insulin to 0.02-0.05U/kg/hr. Do not allow the serum glucose to fall below 11.1 in DKA or 13.9-16.7 in HHS.
4. Bicarbonate
   - Call ETP prior to Bicarbonate initiation
   - Not routinely given
   - pH less than or equal to 6.9 give 100 mEq of sodium bicarbonate. If potassium is less than 5.3 mEq/L add 20 mEq KCL.
5. Phosphate
   - Call ETP prior to Phosphate initiation
   - Should not routinely be replaced.
   - If severe hypophosphatemia occurs as defined by 0.32 mmol/L potassium or sodium phosphate 20-30 mEq can be added to 1L of saline.

Evidence Based Practice

Hypoglycemia

Supportive

- D10
- D50W
- Glucagon
- Option to treat and release
- Point of Care Blood Glucose Monitoring

Neutral

- Oral Glucose
- Thiamine

Against

Hyperglycemia

Supportive

Neutral

- Fluid Bolus

Against

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Practice Updates

- 2023-09-29: added glucagon to FR and EMR interventions

E02: Adrenal Crisis

Richard Armour and Chris Millar

Updated: September 29, 2023
Reviewed: March 01, 2021

Introduction

Acute adrenal insufficiency, or adrenal crisis, is a life-threatening endocrine emergency caused by a lack of cortisol (the most common glucocorticoid). Primary adrenal insufficiency is caused by a loss of function of the adrenal gland while secondary adrenal insufficiency is a result of compromised adrenal function, due to a lack of adrenocorticotropic hormone. Patients who are unwell with a past medical history of Addison's disease (the incidence of which varies from 1-6 out of ever 100,000 individuals) should be routinely evaluated for signs of an adrenal crisis; these individuals may carry their own hydrocortisone injections.

Paramedic and EMR/FR treatment for adrenal insufficiency includes the maintenance of airway patency, supporting oxygenation and ventilation, providing adequate fluid resuscitation, correction of hypoglycemia, and the early recognition of these crises leading to the timely administration of hydrocortisone.

Essentials

- In undifferentiated, critically ill patients, routinely assess for a history of Addison's disease or a pre-existing prescription for hydrocortisone injection.
- The administration of a single dose of hydrocortisone to patients with adrenal insufficiency is never harmful. The failure to recognize and treat an adrenal crisis may rapidly result in death.
- In patients with suspected adrenal crisis, hydrocortisone should be administered prior to movement, as some patients may lack a sufficient adrenal reserve to allow for safe transfer to a stretcher.
- Intravenous administration of hydrocortisone is preferred over the intramuscular route. However, IM administration should be provided early when IV access is delayed or unobtainable.
- Patients on long-term (> 3 weeks) glucocorticoid therapy are at risk for secondary adrenal insufficiency.
- Any source of stress (illness, trauma, mental health crisis) in patients with chronic adrenal insufficiency may be sufficient to provoke a crisis.

Additional Treatment Information

- Caution: Patients with suspected adrenal crisis should never be ambulated to the ambulance.
- Hydrocortisone should be administered to patients with suspected adrenal crisis, regardless of whether the patient received hydrocortisone prior to paramedic or EMR/FR arrival.
- Adrenal insufficiency may commonly co-occur with diabetes mellitus. Ensure blood glucose is assessed in all patients with suspected adrenal crisis and treat accordingly.
- In the rare circumstance where a patient with known or suspected adrenal insufficiency also presents with anaphylaxis, administer EPINEPHrine before hydrocortisone.
- Glucocorticoids are used in many chronic medical conditions such as autoimmune disorders, asthma, inflammatory bowel disease, and cancer. In patients with prolonged use of glucocorticoids (3 weeks or more), this may cause suppression of ACTH release, and place the patient at risk of secondary adrenal insufficiency.
- Common glucocorticoids include prednisone, prenisolone, dexamethasone, betamethasone, and hydrocortisone.
- Previous adrenal crisis places the patient at greater risk for future adrenal crises.

General Information

Prior to considering treatment with glucocorticoids, patients must be evaluated appropriately. Hydrocortisone therapy is appropriate in those patients who have:

Signs and symptoms of an adrenal crisis:

- Nausea and vomiting
- Hypoglycemia
- Hypotension

- Weakness
- Dizziness
- Confusion or altered levels of consciousness

And:

- A history of any of:
  - 3 weeks or more of glucocorticoid use
  - Non-compliance or cessation of chronic glucocorticoid therapy (including difficulties with compliance because of nausea/vomiting or prolonged illness)
  - Addison's disease
  - Pituitary insufficiency

And:

- Been prescribed hydrocortisone for management of adrenal insufficiency.

Steroid use should be avoided in patients with acute traumatic head injuries.

Interventions

First Responder

- Position supine to improve blood pressure and do not walk the patient.
- Provide supplemental oxygen as required.
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$.
  - → A07: Oxygen Administration
- May assist patient in administering own hydrocortisone injection if available. Assistance is limited to physically collecting medication. EMRs **must not prepare or administer hydrocortisone.**
- Obtain capillary blood glucose sample; if hypoglycemic:
  - → E01: Hypoglycemia and Hyperglycemia

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access for drug administration; do not delay hydrocortisone in cases of failed or difficult vascular access
- → D03: Vascular Access
  - Normal saline to correct hypoperfusion or hypotension
- Dextrose to normalize blood glucose
  - → E01: Hypoglycemia and Hyperglycemia
- □□ **Requires completion of PCP scope expansion education:**
  - Hydrocortisone IV (IM is acceptable if vascular access is unavailable)
  - ClinCall consultation required prior to the administration of hydrocortisone

References

1. Baines A. Adrenal insufficiency: Improving paramedic practice. 2015. [Link]

Practice Updates

- 2023-09-29: enabled guideline

E03: Hyperkalemia

Andrew Mills

Updated: October 26, 2021
Reviewed: March 01, 2021

Introduction

Although there are many potential electrolyte disturbances, hyperkalemia is arguably the most serious. In addition, it may be reasonably identified and treated in the out-of-hospital environment based on clinical features. The strict laboratory testing diagnosis of hyperkalemia is a serum potassium level over 5.5 mmol/L.

In rare cases with signs of hemodynamic compromise and potentially life-threatening arrhythmias, a clinical suspicion of hyperkalemia may be sufficient for initiating treatment.

Essentials

- The lethality of hyperkalemia is directly related to the rapidity with which the condition has developed, in addition to the absolute level of serum potassium.
- Correlation of specific ECG changes with specific serum levels has not been adequately demonstrated.
- Clinical suspicion of hyperkalemia alone is not cause for treatment in the out-of-hospital setting.
- Treatment of life-threatening hyperkalemia aims at preventing or resolving lethal arrhythmias and restoring hemodynamic stability. This can be accomplished by stabilizing the myocardium, shifting potassium back into the intracellular space, and removing excess potassium from the body. The majority of these interventions are only available in hospital.

Additional Treatment Information

- Bradyarrhythmias with bizarre morphologies should prompt a strong consideration of hyperkalemia.
- To warrant out-of-hospital intervention, patients must present with significant hemodynamic or arrhythmogenic instability, alongside a suspicion of hyperkalemia as the likely cause.
- Sodium Bicarbonate should only be used with a suspicion of concurrent underlying metabolic acidosis

General Information

- Classic causes of hyperkalemia:
  - Increased intake, either through potassium supplementation or diet
  - Increased production, as occurs in hemolysis, rhabdomyolysis, extensive burns, intense physical activity, or trauma (particularly crush injuries and tissue ischemia)
  - Decreased excretion, caused by acute or end-stage chronic renal failure, or by some drugs (such as nonsteroidal anti-inflammatory drugs, cyclosporine, potassium-sparing diuretics, and ACE inhibitors)
  - Shifts from intracellular to extracellular fluid as a result of acidosis (either metabolic or respiratory), insulin deficiency, or some drugs (particularly succinylcholine in certain populations, beta blockers, and digoxin)
- Clinical features of hyperkalemia are often non-specific:
  - Generalized muscle weakness, paresthesia and/or absent deep tendon reflexes
  - In rare cases, muscular paralysis and hypoventilation may be observed
  - Mental status change including confusion, fatigue, and lethargy
  - Signs of renal failure, such as edema, skin changes, and dialysis sites, may be present
- The ECG is one of the most important diagnostic tools in detecting hyperkalemia. ECG changes associated with hyperkalemia include:
  - Tall, tented T-waves
  - Flattened or absent P-waves
  - Prolonged PR Interval
  - Wide QRS
  - Bradycardia
- These changes may progress to bizarre QRS complexes, sine waves, or asystole.

Interventions

First Responder

- Keep patient at rest in a position of comfort
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Initiate rapid conveyance
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access for hypotension or hypoperfusion
  - → D03: Vascular Access and Fluid Administration

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain vascular access if not already done.
  - → D03: Vascular Access and Fluid Administration
- In patients with significant hemodynamic instability or dysrhythmia and a suspicion of hyperkalemia:
  - CliniCall consultation required prior to treatment of hyperkalemia.
  - Stabilize cellular action potential:
    - Calcium chloride
      - May repeat after 5 minutes if ECG changes persist or recur
  - Shift potassium intracellularly:
    - Sodium bicarbonate (only with a suspicion of concurrent underlying metabolic acidosis)
    - Salbutamol

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Stabilize cellular action potential:
  - Calcium gluconate IV: 1.0 g slow push over 2-3 minutes; may repeat once after 5 minutes if ECG changes persist or recur
- Shift potassium intracellularly:
  - D10W with 10-20 U insulin R mixed: give 500 mL intravenously over 60 minutes, or:
    - Insulin R 10 units IV followed by glucose 25 g IV
    - Sodium bicarbonate IV: 150 mEq in 1 L D5W over 2-4 hours depending on volume status
- Eliminate potassium:
  - Furosemide IV: 40 mg every 12 hours
- Consider Kayexalate
  - 30-60 g PO

References

1. Mount DB. Treatment and prevention of hyperkalemia in adults. In UpToDate. 2019. [Link]
2. Lehnhardt A et al. Pathogenesis, diagnosis and management of hyperkalemia. 2011. [Link]
3. North Carolina Office of EMS. Dialysis/Renal Failure. 2012. [Link]
4. Porter RS et al. The Merck manual of diagnosis and therapy. 20th edition. 2018.

E04: Dialysis Emergencies

Michelle Haig and Rebecca Kroeker

Updated: January 31, 2024
Reviewed: March 01, 2021

Introduction

Patients who suffer from an acute or chronic injury or illness to their kidneys are at risk of developing kidney failure. Treatment options depend upon the patient's clinical condition and comorbidities, ranging from conservative treatment with medication and fluids, to peritoneal dialysis, hemodialysis, or kidney transplantation.

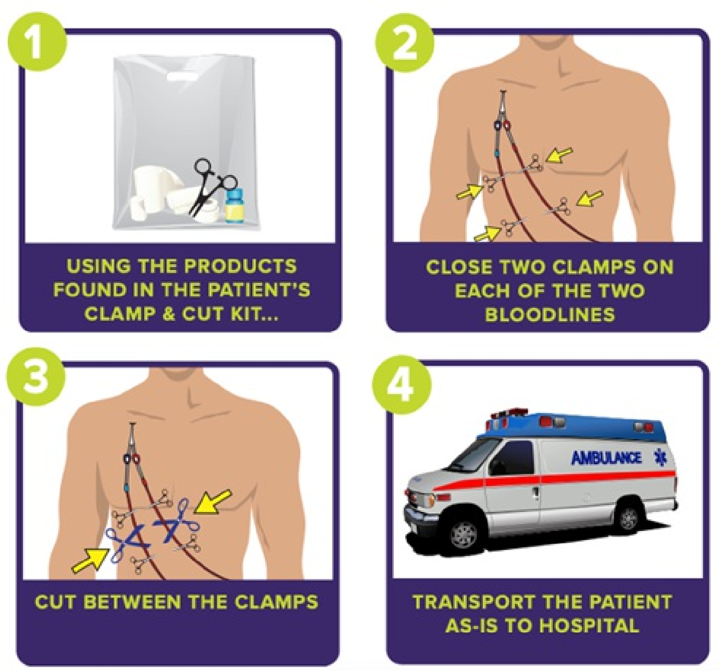
Essentials

- Patients requiring renal dialysis often have numerous other medical problems, including hypertension, diabetes, and cardiovascular disease. Paramedics and EMRs/FRs should be alert to the possibility of concurrent clinical issues.
- Do not attempt to take blood pressures, or initiate intravenous access, in an extremity that has a dialysis shunt or fistula in place.
- Always consider the possibility of hyperkalemia in patients on dialysis or with renal failure.
- Dialysis patients should be conveyed preferentially to a facility capable of providing dialysis services. If the patient is critically ill, convey the patient to the nearest facility. Contact CliniCall for assistance with appropriate clinical pathway.

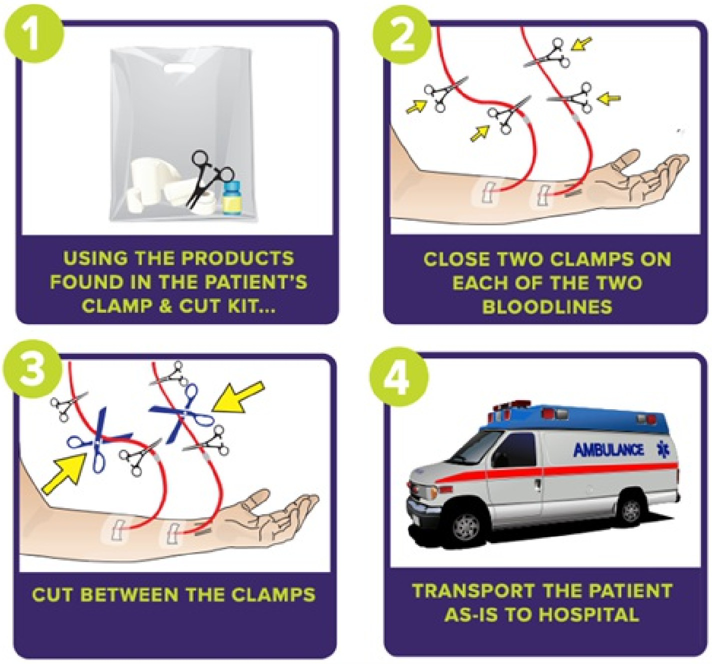
Additional Treatment Information

Emergency Disconnect Instructions

For dialysis patients with a central catheter:



For patients with a fistula or graft:



Referral Information

It may be reasonable to bypass the emergency department in favour of conveyance to the patient's dialysis clinic. CliniCall consultation recommended to discuss care planning and conveyance options.

General Information

- Peritoneal dialysis uses the peritoneal membrane in the body itself as a filter. This membrane is a fine layer of tissue lining the peritoneal cavity. The peritoneal cavity's rich vascular supply makes the peritoneal membrane ideal for filtering metabolic wastes and excess fluid from the blood. Dialysis solution is instilled into the abdominal cavity via a surgically inserted Tenckhoff Catheter. Metabolic waste products then pass from the bloodstream, across the peritoneal membranes, and into the dialysis solution. After a period of dwelling time, the solution is drained from the peritoneal space and replaced with a fresh solution.
- In hemodialysis, blood is pumped from the body through special tubing into a dialysis machine via a surgically inserted catheter or arterio-venous (AV) fistula. This typically occurs 3 or 4 days per week at a dialysis centre but can also be performed daily at home. A hemodialysis machine removes waste products and excess fluid from the blood and, as such, acts as a type of artificial kidney. The blood passes through a dialyser (filter), which also assists in balancing fluids and electrolytes in the blood. The machine then returns the filtered and cleansed blood to the body at the same rate at which it was removed.
- Patients undergoing hemodialysis will have a long-term catheter or shunt placed for this procedure. Catheters are typically placed in the upper chest and shunts are typically placed in an arm or forearm. The shunt is created by anastomosing a vein and an artery; turbulence can be felt on the shunt when it is palpated and a bruit can be heard when it is functioning properly.
- Common complications of dialysis treatment include:
  - Infection at the shunt or catheter site, or systemically
  - Disequilibrium syndrome develops when a shift of metabolic waste and electrolytes occurs, causing weakness, dizziness, nausea and/or vomiting, and seizures
  - Hypotension can cause altered LOC, angina, seizures, or arrhythmia, and typically responds to a small fluid bolus of 250 mL normal saline
  - Occlusion or disruption of the Tenckhoff catheter
  - Some medications are filtered out by the dialyser, limiting their therapeutic effect
  - Air embolism
  - Shunt bleeding typically following a hemodialysis session, which will occur in 1 to 4 tiny holes made by needles
    - To treat, apply direct pressure to control. When the bleeding stops, tape over the gauze but do not remove the gauze to check for control as this will usually cause more bleeding. Circumferential dressings, if used, should not be used as this can occlude the shunt and cause clotting. The tape should, at a maximum, envelope about 180 degrees of the extremity.

Interventions

First Responder

- Keep patient at rest
- Control bleeding as required
- Position patient based on comfort and prevent heat loss

Emergency Medical Responder – All FR interventions, plus:

- Convey in position of comfort
  - CliniCall consultation recommended to discuss care planning and conveyance options.
- If at a dialysis facility, engage with staff to provide appropriate care to patient
  - CliniCall consultation required prior to initiating treatment or emergency disconnection procedures.
- If patient is attached to a home dialysis machine *and* is critically ill:
  - CliniCall consultation required prior to initiating treatment or emergency disconnection procedures.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access
  - → D03: Vascular Access
  - Normal saline if systolic blood pressure is < 90 mmHg or if signs of end-organ hypoperfusion exist
- Correct hypoglycemia
  - → E01: Hypoglycemia and Hyperglycemia

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- In patients with significant hemodynamic instability or dysrhythmia and a suspicion of hyperkalemia
  - → E03: Hyperkalemia

References

1. Mount DB. Treatment and prevention of hyperkalemia in adults. In UpToDate. 2019. [Link]
2. North Carolina Office of EMS. Dialysis/Renal Failure. 2012. [Link]
3. Queensland Ambulance Service. Clinical Practice Procedures: Other/emergency evacuation from home dialysis. 2019. [Link]

E05: Abdominal Pain

Sheena Osborne

Updated: May 25, 2021
Reviewed: March 01, 2021

Introduction

Abdominal pain is one of the most common out-of-hospital complaints and features a broad and varied list of potential causes, ranging from benign to life threatening. In the absence of laboratory testing and diagnostic imaging, it can be extremely difficult to differentiate between causes of abdominal pain.

Common origins for abdominal pain can include biliary tract diseases, appendicitis, peptic ulcers, diverticulitis, acute gastroenteritis, renal colic, urinary tract infections, gastroesophageal reflux disease, constipation, bowel obstruction, and many others. When examining a patient with abdominal pain, paramedics and EMRs/FRs must be aware that the pain may be originating from outside of the gastrointestinal system. Consider cardiac, urinary, reproductive, respiratory, and toxicological origins in these cases.

The out-of-hospital care of abdominal pain centres on the early identification of life-threatening causes, the management of symptoms and physiological dysfunction, and improving patient comfort.

Essentials

- Identify and communicate potentially life-threatening causes of abdominal pain.
- Identify and correct hypovolemia.
- Provide symptom relief.

Additional Treatment Information

- Fluid replacement should be considered if clinical signs of dehydration or hypovolemia are present. These can include dry mouth or tongue, poor skin turgor (i.e., tenting), and a history of diminished oral intake or fluid loss (vomiting, diarrhea).
- Manage nausea and vomiting. Paramedics and EMRs/FRs should be particularly alert to the presence of blood or 'coffee ground' emesis. Maintain patient dignity and comfort during episodes of nausea and vomiting.
- Consider assessing blood glucose levels in cases of prolonged vomiting, anorexia, or limited oral intake.
- Practitioners should ensure that acute abdominal pain is managed adequately with analgesic medications. Strong evidence supports the use of narcotic analgesics in this patient population. Use of analgesia does not affect the accuracy of in-hospital assessment or diagnosis.

General Information

- Use appropriate personal protective equipment. Contact precautions may be warranted in patients who exhibit signs and symptoms consistent with infectious causes of abdominal pain. Fever, nausea and vomiting, loose stools or diarrhea, myalgia, and headache may be the result of norovirus infection. Refer to BCEHS Infection Control and Prevention material for additional guidance on the selection and use of personal protective equipment.
- Potentially life-threatening causes of abdominal pain or discomfort include:
    - *Aortic aneurysm or dissection* is sometimes accompanied by a known history of aneurysm, or pain characterized as ripping or tearing, with radiation to the back. It may correspond to a syncopal event. Pain from an aortic dissection is generally above the diaphragm, and may manifest itself as chest or back pain. Leaking or disrupted abdominal aortic aneurysms produce pain below the diaphragm.
        - → C05: Acute Aortic Dissection
    - *Acute coronary syndromes* can manifest as pain above the umbilicus and should be considered in all patients over the age of 35.
        - → C01: Acute Coronary Syndrome
    - A *perforated abdominal viscus* is often associated with a history of peptic ulcer disease or diverticulitis. It is characterized by the rapid onset of abdominal pain accompanied by abdominal rigidity, guarding, and rebound tenderness. Patients are commonly febrile and nauseated.
    - Although uncommon, *ectopic pregnancies* should be considered in any woman of childbearing age with lower abdominal quadrant pain. A syncopal event, associated with abdominal pain in this population, is suggestive of a ruptured ectopic pregnancy.
    - *Mesenteric ischemia* should be suspected in patients who have a sudden onset of severe pain which can be disproportionate to the physical findings. Atrial fibrillation and prior cardiovascular disease are risk factors. The mortality rate can be as high as

70%.

- Constant pain in the epigastrum radiating to the back should prompt a consideration of *pancreatitis*. Risk factors include alcohol abuse and biliary tract disease. Consider the possibility of diabetic ketoacidosis in Type 1 diabetics.
- Abdominal pain associated with dark, tarry stools, or frank blood in stool or emesis, is suggestive of a *gastrointestinal hemorrhage*. Significant quantities of blood can be lost through gastrointestinal bleeding; watch for signs of hypotension.
- *Anaphylaxis* can provoke abdominal pain, cramping, nausea, vomiting, and diarrhea.
  - → E09: Anaphylaxis
- Abdominal pain can also be associated with *sepsis*
  - → K02: Sepsis

Interventions

First Responder

- Place patient in position of comfort where possible
- Prevent heat loss
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Consider analgesia:
  - → E08: Pain Management
    - Nitrous oxide (self-administered) to effect
    - Nitrous oxide should be used with caution in abdominal pain as the gas has a tendency to diffuse into air-filled spaces; its use is contraindicated in patients with gross abdominal distension

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access:
  - → D03: Vascular Access
  - Consider volume replacement to correct hypotension; target systolic blood pressure of 90 mmHg
- Consider symptom relief for ongoing nausea or active vomiting
  - → E07: Nausea and Vomiting
    - DimenhyDRINATE

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain and interpret 12-lead ECG in patients over 35 and pain above the umbilicus
  - → PR16: 12-Lead ECG
  - → C01: Acute Coronary Syndrome
- Consider symptom relief for ongoing nausea or active vomiting
  - → E07: Nausea and Vomiting
- Consider analgesia
  - FentaNYL

Evidence Based Practice

Abdominal Pain

Supportive

- Analgesia (narcotic)

- [Fentanyl]
- [Ketamine]
- [Analgesia (NSAIDs)]
- [Nitrous Oxide]

Neutral

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. Breum BM. Accuracy of abdominal auscultation for bowel obstruction. 2015. [Link]
4. Marx JA, et al., editors. Rosen's emergency medicine: Concepts and clinical practice. 8th edition. 2014.
5. Thomas SH, et al. Effects of morphine analgesia on diagnostic accuracy in emergency department patients with abdominal pain: a prospective, randomized trial. 2003. [Link]
6. Tintinalli JE, et al. Tintinalli's emergency medicine: A comprehensive study guide. 9th edition. 2019.

E06: Non-Traumatic Back Pain

Christiana Gregory and Marc Gessaroli

Updated: February 04, 2022
Reviewed: February 04, 2022

Introduction

Approximately 84% of adults will experience back pain at some point in their lives. Episodes of non-traumatic back pain are mostly self-limited and are most often not indicative of a serious medical condition. Acute non-traumatic back pain, as defined by an episode of pain less than four weeks in length, can generally be managed in the primary care setting. However, a small percentage of patients will have serious, potentially life-threatening causes of back pain; careful history taking and physical examination are required to identify conditions such as cauda equina syndrome, abdominal aortic aneurysmal leak, vertebral infections, and spinal fractures.

Essentials

- Paramedics and EMRs/FRs must rule out life-threatening causes of back pain. Foremost among these is cauda equina syndrome, but conditions that can produce back pain as a symptom must be considered as well, particularly leaking aortic aneurysms and peritoneal bleeding.
- Patients should receive analgesia whenever possible.

Additional Treatment Information

- Acetaminophen is considered safe and effective pain management. Nitrous oxide, fentaNYL, and ketAMINE may facilitate conveyance in cases of severe pain and discomfort.

Referral Information

Eligible patients may be referred to Urgent and Primary Care Centres in specific areas using the Non-Traumatic Back Pain assess, see, treat and refer pathway.

General Information

- The most serious cause of back pain is *cauda equina syndrome*. This is a condition where the nerve roots in the lower spinal cord become compressed. Cauda equina syndrome can have a fast or slow onset. Signs and symptoms of cauda equina include:
  - 'Saddle' anesthesia (an altered sensation around the groin and inner thigh, as would be in contact with a saddle while riding a horse)
  - Leg weakness or numbness (can affect either leg or both)
  - Bowel and bladder incontinence (considered a late finding)
- Infections of the vertebrae should be considered if the patient has a history of fever or recent infection, is immunocompromised, or has used intravenous drugs

Interventions

First Responder

- Assist patient to position of comfort
- Consider ice/heat packs

Emergency Medical Responder – All FR interventions, plus:

- Provide appropriate analgesia
  - → E08: Pain Management

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- See procedural analgesia

Evidence Based Practice

Mechanical Back Pain

Supportive

- Ketamine
- Morphine
- Fentanyl
- Nitrous Oxide

Neutral

- Benzodiazepines

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]

Practice Updates

- 2022-02-03: Added Non-Traumatic Back Pain ASTaR information.

E07: Nausea and Vomiting

Marc Gessaroli and Christiana Gregory

Updated: March 22, 2024
Reviewed: September 29, 2023

Introduction

Nausea is the unpleasant, disabling, and painless urge to vomit. It can exist independently or be accompanied by vomiting. The potential causes for nausea and vomiting are extensive; nausea and vomiting are not considered diseases in and of themselves but rather symptoms of other conditions. In caring for individuals with nausea and/or vomiting, paramedics and EMRs/FRs should work towards two goals: identification of the underlying cause to determine appropriate treatment and the management of symptoms to improve patient comfort.

Essentials

- An attempt at identifying acute etiologies for nausea and vomiting must be made.
- Provide therapies to alleviate symptoms.
- Facilitate appropriate conveyance.

Additional Treatment Information

- Intramuscular (IM) dimenhydrinate is a safe and effective anti-emetic. It should only be used for nausea that is actually present and not be considered for prophylaxis.
- Ondansetron is an effective anti-emetic for nausea and vomiting secondary to radiation, chemotherapy, surgery, and gastroenteritis. It provides little relief from motion sickness.
- Dimenhydrinate must be used with caution for head injuries as it may cause further CNS dysfunction. Ondansetron is preferred in these patients as control of vomiting is important to limit the increase in intracranial pressure.
- Look for the following signs of dehydration: postural perfusion changes including tachycardia; hypotension or dizziness; decreased sweating and urination; poor skin turgor; dry mouth/tongue; fatigue; altered consciousness; and evidence of poor fluid intake compared to fluid loss. Dehydrated patients are candidates for volume replacement.
- Older adults may be more sensitive to the side effects of dimenhyDRINATE, especially drowsiness, confusion, constipation, or trouble urinating. Drowsiness and confusion can increase the risk of falling. Reduce the dosage administered to elderly or frail patients.

General Information

- A complete physical and neurological assessment should be completed for all patients. Acute etiologies may include but are not limited to:
  - Myocardial infarction
    - → C01: Acute Coronary Syndrome
  - Cerebrovascular accident
    - → F03: Stroke
  - Sepsis
    - → K02: Sepsis
  - Gastrointestinal bleeding
  - Meningitis
  - Ischemic bowel
  - Diabetic ketoacidosis
    - → E01: Hypoglycemia and Hyperglycemia
  - Overdose or drug toxicity (consider adverse drug reactions)
  - Carbon monoxide poisoning
    - → J02: Carbon Monoxide
- Common causes of nausea and vomiting include:
  - Vertigo: One of the most common causes of out-of-hospital nausea/vomiting, this is the perceived sensation of motion often described as spinning or whirling. Sweating, pallor, nausea, vomiting, and balance disturbances often accompany vertigo.

Vertigo is caused by many different factors including:
  - Impaired visual input, inner ear function, or peripheral sensory input
  - CNS impairments (e.g., alcohol, prescription drugs)
  - Disease (e.g., Meniere's disease)
- Migraines: These headaches can last from minutes to days and are characterized by intense throbbing pain, photosensitivity, nausea and vomiting, and sweating. Patients may be prescribed metoclopramide as it treats both the pain and nausea associated with suspected migraines.
- Opioid-induced: Due to the low incidence of opioid-induced nausea, the lack of efficacy of prophylactic therapy, and the possibility of additional side effects, opioids should not be accompanied by an antiemetic agent. Antiemetic therapy is only indicated if the patient develops nausea or vomiting after opioid use.
- Alcohol withdrawal: Patients experiencing alcohol withdrawal are at higher risk of developing electrolyte abnormalities which can affect the QT interval. Dimenhydrinate is the antiemetic of choice in these cases as it does not cause QT interval elongation.
- Upper gastrointestinal bleeding: Blood in the stomach is often a cause of extreme nausea. Metoclopramide can be useful in these cases as it improves gastric emptying in addition to treating nausea.
- Pregnancy: Nausea can be a common issue during pregnancy, especially in the first trimester and in the morning. Dimenhydrinate is considered to be the first-line medication for nausea and vomiting that is safe and effective during pregnancy. Women should be reassured as to dimenhydrinate's safety and low risk of toxicity for the fetus.

Interventions

First Responder

- Keep the patient at rest in a position of comfort
- Maintain patient in position of comfort consistent with the need to protect the patient's airway
  - → B01: Airway Management

Emergency Medical Responder – All FR interventions, plus:

- Convey patient in position of comfort consistent with the need to protect the patient's airway
  - → B01: Airway Management

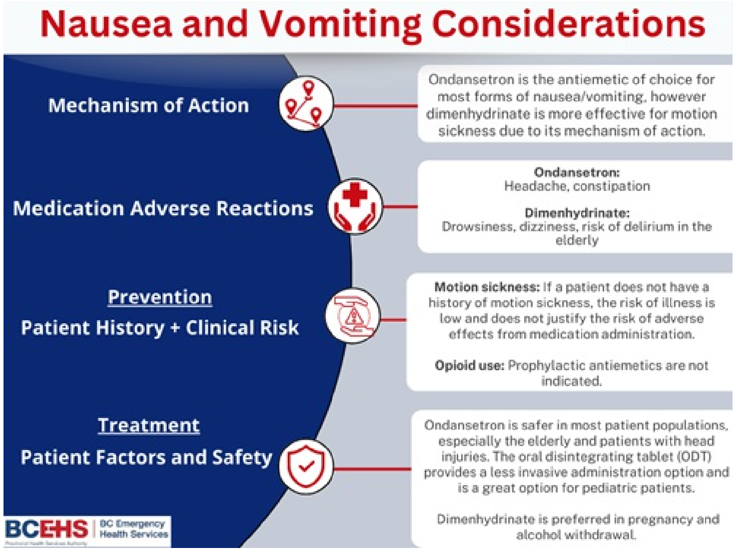
Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access
  - → D03: Vascular Access
- Consider dimenhyDRINATE
- Consider ondansetron
- ◻◻ **PCP and ACP: requires completion of scope expansion education or other appropriate BCEHS-specific education**
- Treat hypotension from volume loss:
  - Normal saline 500 mL bolus to a maximum of 2 L
  - Reassess after every bolus; target systolic blood pressure of 90 mmHg

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider Zofran
- Consider Metoclopramide
- Consider Stemetil

Algorithm



Patient Characteristic	DimenhyDRINATE	Ondansetron
Head Injury	Must be used with caution as it may cause further CNS dysfunction.	Preferred in these patients as control of vomiting is important to limit the increase in intracranial pressure.
Older Adults	Older adults may be more sensitive to the side effects of dimenhyDRINATE, such as drowsiness, confusion, constipation, or trouble urinating.	Due to these risks, and the American Geriatric Society's (AGS) Beers criteria, ondansetron should be the antiemetic of choice in the elderly populations, if etiology permits.
Pregnancy	Preference is given to dimenhyDRINATE for nausea and vomiting during pregnancy. Pregnant patients should be reassured that dimenhyDRINATE is safe and low risk of toxicity for the fetus.	Use of ondansetron in early pregnancy (first trimester) is controversial.
Alcohol Withdrawal	The preferred antiemetic due to its lack of QT interval elongation side effects, in contrast to ondansetron. This distinction is important, especially when dealing with electrolyte imbalances in alcohol withdrawal.	Has QT interval elongation side effects unlike dimenhyDRINATE.

Evidence Based Practice

Nausea and Vomiting

Supportive

- Antiemetic (Central)
- Antiemetic (GI Action)
- Isopropyl alcohol

Neutral

Against

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. American Gastroenterological Association. Medical position statement: Nausea and vomiting. 2001. [Link]

Practice Updates

- 2023-09-29: added ondansetron to PCP interventions

E08: Pain Management

Dugg Steary

Updated: December 19, 2023
Reviewed: February 06, 2023

Introduction

The relief of pain is one of the most significant and meaningful interventions paramedics and EMRs perform in the out-of-hospital setting. It is expected that paramedics and EMRs will provide timely and effective pain management to all patients in their care. Controlling pain can calm patients and assist in the assessment and management of other clinical problems. The demeanour and language used by paramedics and EMRs can dramatically influence the efficacy of any analgesic strategy - even opioid-based analgesia will not work if patients do not trust their providers

Essentials

- Always use a progressive and multimodal approach to controlling your patient's pain. Non-medication strategies have proven effects to decrease patient pain. Always progress from the simplest to the more invasive or complicated medication deliveries. Do not forgo basic strategies in favour of more complicated approaches.
- As part of a progressive and multimodal approach, consider all benefits and effects of interventions as part of your patient's pain management. For example, with the knowledge that acetaminophen and ibuprofen have the same effects as an opioid medication but take longer for effect, administer early and bridge with another medication (eg. nitrous oxide) while awaiting the onset.
- Typical measures should always include reassurance, gentle handling, control of temperature, positioning of the patient or limbs, and splinting of injured limbs.
- As interventions are applied, continue to assess and record their effects.
- An inability to report or rate pain should not preclude analgesia. Where discomfort is evident in the setting of potentially painful stimuli, consider options for analgesia. The pain ladder is an effective tool to assist in rating the patient's pain and response to pain management.

Additional Treatment Information

- When combined with positive reinforcement, nitrous oxide (Entonox) is an effective analgesic. It is the agent of choice in many countries for use in childbirth. The contraindications to the use of nitrous oxide are the result of the pathophysiology of gas exchange and absorption (primarily the trapping of gas and the development of hypoxia).
- Nitrous oxide can cause rebound hypoxemia due to the displacement of oxygen from the alveoli as it diffuses out of the bloodstream. Supplemental oxygen following the use of nitrous oxide will prevent the development of this hypoxemia and should be provided to all patients.
- Acetaminophen daily maximum dose is not to exceed the lesser of 75 mg/kg or 3,000 mg in a 24-hour period. This ***includes*** any medications containing acetaminophen that was consumed prior to paramedic administration.
- Methoxyflurane (Penthrox) daily maximum dose is 6 mL in a 24-hour period. This dose includes any provided by first responders e.g. ski patrol and cannot be exceeded.
- Methoxyflurane (Penthrox) is contraindicated in known ***or*** suspected pregnant patients
- Fentanyl is an opioid analgesic. It is generally less prone to causing hypotension than morphine, though a drop in blood pressure is likely once adequate analgesia is achieved due to a reduction in overall sympathetic stimulation. Fentanyl ***does not*** provide a greater degree of analgesia than morphine.
- Ketamine provides excellent analgesia, sedation, and dissociation dependent on dosing. As an analgesic, ketamine has significant advantages in the out-of-hospital setting: it allows the patient to breathe spontaneously, maintain many of their own protective airway reflexes, and tends to elevate blood pressure through the release of catecholamines.

General Information

- Approach each call with a view to assessing a patient's pain and exploring ways to help alleviate it.
- Every intervention and medication has important side effects. Some of these may actually worsen a patient's pain or experience. Always use interventions most likely to provide positive assistance.
- As interventions are applied, continue to assess and document the effects of the interventions by measuring the patient's pain. In cases where patients are unable to describe their pain effectively (because of language barriers, altered levels of consciousness, age, or dementia), other signs of pain must be monitored. Consider the use of facial expressions, the guarding of

limbs, tears or crying, moaning, restlessness, heart rate, and blood pressure – all may provide clues and allow paramedics and EMRs to manage pain more effectively.

- In special populations, specific pain assessment tools may be useful. Consider the FLACC scale in children or the Abbey scale in adults with dementia.

Interventions

First Responder

- **Adult and Pediatric Patients (all pain levels):**
  - Non-medication management
    - Keep the patient at rest in a position of comfort, and provide reassurance
    - Splint/support any injured extremity
    - For injuries, consider ice packs or heat packs applied to the injury site in conjunction with elevation where clinically appropriate

Emergency Medical Responder – All FR interventions, plus:

Adult patients (MILD pain level):

- Non-medication management
- Nitrous Oxide (Entonox)
- Acetaminophen
- Ibuprofen

Adult patients (MODERATE or SEVERE pain level)

- Non-medication management
- Nitrous Oxide (Entonox)
- Acetaminophen
- Ibuprofen
- Methoxyflurane (Penthrox)

Always use a progressive and multimodal approach to controlling your patient’s pain.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Nausea associated with the administration of methoxyflurane is rare and there is no need to routinely administer anti-emetics prior to analgesia. Anti-emetics may be considered if nausea develops during administration:
  - DimenhyDRINATE
- Acetaminophen IV (***currently on hold***)
- Consider need for palliative approaches for patients with life-limited illnesses:
  - → CPG P03: Palliative Care - Pain

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

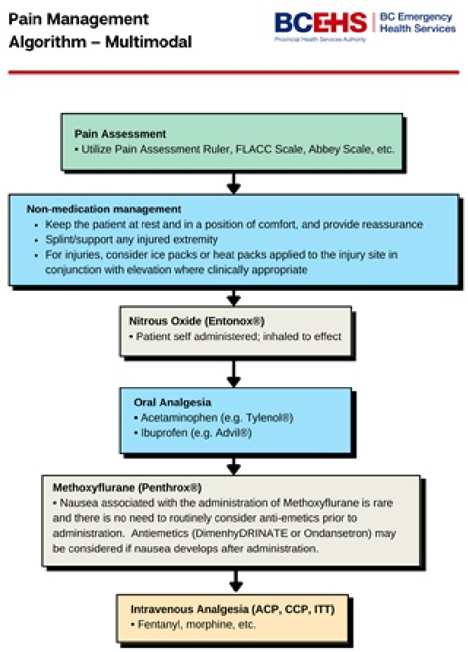
- FentaNYL
- KetAMINE
- MORPHine
- Nausea associated with the administration of fentaNYL and ketAMINE is rare and there is no need to administer anti-emetics prior to analgesia; they may be considered if nausea develops after administration:
  - DimenhyDRINATE
  - Ondansetron

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- HYDROmorphone

- [KeTORolac]

Algorithm



Adapted from Manchester Triage System (December 2020)

Evidence Based Practice

Analgesia

Supportive

- Acetaminophen IV
- Acetaminophen PO
- Fentanyl
- Ketamine
- Ketorolac (Toradol)
- Methoxyflurane (Penthrox)
- Morphine
- Nitrous Oxide
- NSAIDs

Neutral

Against

- Benzodiazepines

References

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2. Krebs EE et al. Effect of opioid vs nonopioid medications on pain-related function in patients with chronic back pain or hip or knee osteoarthritis pain the SPACE randomized clinical trial. 2018. [Link]
3. Lindbeck G et al. Evidence-based guidelines for prehospital pain management: recommendations. 2022. [Link]
4. Sobieraj DM et al. Comparative effectiveness of analgesics to reduce acute pain in the prehospital setting. 2020. [Link]
5. Teater D. Evidence for the efficacy of pain medications. n.d. [Link]

Practice Updates

- 2023-02-06: updated guideline to reflect changes to scope of practice for EMRs and introduction of methoxyflurane into practice.
- 2023-02-13: fixed spelling error

E09: Anaphylaxis

Joe Acker

Updated: December 19, 2023
Reviewed: September 29, 2023

Introduction

Allergic reactions range from localized urticaria to life-threatening anaphylaxis. Anaphylaxis is the most severe form of an immediate hypersensitivity reaction and encompasses both IgE-mediated reactions and anaphylactoid reactions; the latter do not require previous sensitizing exposures. Paramedic and EMR/FR management of anaphylaxis includes maintenance of the airway, breathing, and circulation with epinephrine the primary therapeutic intervention.

Essentials

- Intramuscular administration of EPINEPHrine is indicated for initial care of a patient with systemic signs of anaphylaxis. The anterolateral mid-thigh is the preferred site due to improved absorption.
- Intravenous EPINEPHrine should be reserved for the patient who is extremely hypoperfused or facing impending cardiac arrest.
- Intravenous EPINEPHrine should only be considered after intramuscular EPINEPHrine.
- A patient's own EPINEPHrine auto-injector is an appropriate treatment for anaphylaxis and EMRs can administer a patient's EPINEPHrine autoinjector when associated with signs and symptoms of anaphylaxis.
- Death from anaphylaxis is far more likely to be associated with a delay in management rather than an inadvertent administration of EPINEPHrine.

Additional Treatment Information

- DiphenhyDRAMINE is not effective in life-threatening anaphylaxis. It must not be administered instead of EPINEPHrine. Antihistamine use is intended for controlling urticarial symptoms to improve patient comfort.
- Some patients, particularly those taking beta-blocking medications, will be unresponsive to EPINPEHrine. In consultation with CliniCall, paramedics may elect to give glucagon 1-2 IU IM or IV. Glucagon administration must not delay additional EPINEPHrine.
- Some patients will present with predominant respiratory symptoms of dyspnea and wheezing. Treating with salbutamol for bronchodilation is acceptable if EPINEPHRine has been ineffective. It should only be used after EPINEPHrine administration and not as a first line treatment.
- Patients who are persistently hypoxic and whose condition does not improve following repeated epinephrine doses may require assisted ventilation and advanced airway management. These procedures may be extremely difficult due to distortion of the airway, primarily due to angioedema. Slow, low pressure bag-valve mask ventilation, with sufficient time for exhalation (similar to ventilation in asthma) will improve air flow through bronchioles. Ventilation rates and tidal volumes typically used in patients with respiratory failure can cause serious complications in anaphylaxis: gastric distension; vomiting; pneumothorax; and worsening hypotension can result from high pulmonary pressures.
- Nebulized EPINEPHrine has been used in cases where there is significant airway edema compromising management in addition to IM EPINEPHrine, but there is little data to support its routine use. Nebulized EPINEPHrine must never delay, or substitute for, IM EPINEPHrine.
- The benefit of corticosteroids in anaphylaxis is unproven. Nonetheless, it is common practice to prescribe a 2-day course of oral steroids (e.g., oral prednisolone 1 mg/kg, maximum 50 mg daily) to hopefully reduce the risk of symptom recurrence after a severe reaction or a reaction with marked or persistent wheeze.
- ***Cardiac arrest considerations:***
  - Cardiac arrest may result from angioedema with upper and lower airway obstruction. Immediate cricothyrotomy may be necessary.
    - → PR22: Surgical Airways
  - Severe anaphylaxis may produce profound vasodilation requiring significant volume replacement.

Referral Information

All patients with suspected anaphylaxis must be advised that they should be conveyed to hospital regardless of the severity of their presentation or response to management. International guidelines recommend at least 4 hours of observation following treatment.

General Information

- The patient's history can include exposure to an allergen such as food, bites/stings, medications, or the allergen may be unknown.
- Exposure to an allergen results in the release of inflammatory mediators from mast cells and basophils which cause the signs and symptoms of anaphylaxis. While there are a number of mediators, histamine is the most widely recognized.
- Anaphylaxis is a rapid onset, multiple-organ, generalized hypersensitivity (allergic) syndrome. It is usually characterized by exposure to a known or suspected allergen with a sudden onset of symptoms and at least 1 of the following R.A.S.H. signs/symptoms:
  - **R**espiratory distress (dyspnea, wheeze, cough, stridor)
  - **A**bdominal symptoms (nausea, vomiting, diarrhea, abdominal pain/cramps)
  - **S**kin/mucosal symptoms (hives, welts, itch, flushing, angioedema, swollen lips/tongue)
  - **H**ypotension (or hypoperfusion or altered conscious state)
- In rare circumstances, anaphylaxis can occur with symptoms in an isolated body system. If a patient has hypotension following exposure to a known allergen, consider treating as anaphylaxis.
- Allergic reactions may range in severity from mild, with only a rash, to life threatening. The degree of severity depends on the body's response to the allergen. The tendency is for reactions to increase in severity over time as the body becomes increasingly sensitive and primed to the allergen.

Interventions

First Responder

- Position supine to improve blood pressure and do not walk the patient
- Remove allergen (e.g., scrape off any stinger(s) / stop drug administration)
- Prevent or reverse progression to life-threatening manifestations:
  - EPINEPHrine via autoinjector (EpiPen)
- Provide supplemental oxygen and airway management as required
  - → A07: Oxygen Administration
  - → B01: Airway Management

Emergency Medical Responder – All FR interventions, plus:

- Convey early
- Consider intercept with additional resources
- **Requires completion of EMR scope expansion education:**
  - Prevent or reverse progression to life-threatening manifestations
    - EPINEPHrine
  - **Note:** EMRs must complete EMR-specific scope of practice expansion education prior to EPINEPHrine use (FR scope expansion material is insufficient for BCEHS practice)

Primary Care Paramedic – All FR and EMR interventions, plus:

- Prevent progression to life-threatening manifestations
  - EPINEPHrine
- Treat bronchospasm **after** EPINEPHrine has been administered
  - Salbutamol
- Consider vascular access and fluid administration if patient remains hypotensive or hypoperfused
  - → D03: Vascular Access

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- EPINEPHrine IV/IO if refractory to other routes of EPINEPHrine
- Consider glucagon for persistent hypotension despite fluids and EPINEPHrine in patients taking ACE inhibitors or beta blockers
  - CliniCall consultation recommended to discuss dosing strategies.
- Consider diphenhyDRAMINE to mitigate medium-term effects and limit histamine response
- Intubation or FONA if unable to oxygenate and ventilate; KetAMINE is the preferred induction agent in anaphylaxis

- → PR18: Anesthesia Induction
- → PR22: Surgical Airways

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Mechanical ventilation strategies
- An H_2 antihistamine given with an H1 antihistamine may provide some additional relief of urticaria

Evidence Based Practice

Anaphylaxis

Supportive

- H2 Blocker with Diphenhydramine
- Diphenhydramine
- Epinephrine
- Crystalloid Infusion

Neutral

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. Australasian Society of Clinical Immunology and Allergy. ASCIA Guidelines - Acute management of anaphylaxis. 2020. [Link]
4. Choo KJL et al. Glucocorticoids for the treatment of anaphylaxis: Cochrane systematic review. 2010. [Link]
5. Tintinalli JE, et al. Tintinalli's emergency medicine: A comprehensive study guide. 9th edition. 2019.

Practice Updates

- 2023-09-29: added autoinjector epinephrine to FR interventions; added epinephrine to EMR interventions

E10: Minor Allergy

Laurence Darlington and Kristen Steary

Updated: February 04, 2022
Reviewed: February 04, 2022

Introduction

Allergic reactions are a hypersensitivity response by the immune system to an allergen and can range from localized urticaria to life-threatening anaphylaxis. Minor allergic reactions are typically localized to the integumentary system and are not systemic reactions (as observed in anaphylaxis). Minor allergies present with urticaria and pruritus and can be managed by antihistamine administration in the out-of-hospital environment for patient comfort. Refer to E09: Anaphylaxis for patients with a suspected allergic reaction presenting with concurrent respiratory, cardiovascular, or gastrointestinal complaints.

Essentials

- Minor allergic reactions involve the integumentary system with the presence of urticaria and occasionally mild, localized edema. Minor reactions do not involve any other system (e.g., cardiovascular, respiratory, or gastrointestinal systems).
- Urticaria consists of transient wheals on the skin (raised areas of various sizes, with or without erythema) with pruritus and/or burning sensations. If a patient presents with dermatologic symptoms plus any of hypotension/hypoperfusion, angioedema, respiratory distress, and/or gastrointestinal upset, more aggressive intervention is required.
  - → E09: Anaphylaxis
- Minor allergic reactions are typically managed by removal of the allergen (e.g., removing a stinger or washing a topical lotion from the skin using soap and water) and antihistamine administration (e.g., diphenhydrAMINE).
- EPINPEHrine should not be administered in a minor allergic reaction that involves only the integumentary system.

Additional Treatment Information

- Oral antihistamines are typically sufficient for management of minor allergic reactions. If PO medications cannot be tolerated, diphenhydrAMINE may be administered IM or IV.
- Minor allergies have the potential to exacerbate chronic respiratory illnesses (e.g., asthma or COPD). Patients with a history of respiratory illness should be assessed for worsening of their condition and treated accordingly.
- Patients may have an existing treatment regime utilizing over-the-counter and/or prescribed antihistamines. Additional antihistamines should not be administered if the patient has taken antihistamines prior to paramedic or EMR/FR arrival due to the possibility of potentiation.

Referral Information

- While most cases of isolated urticaria are self-limiting and will resolve without treatment, patients with minor allergic reactions have potential to progress to life-threatening anaphylaxis.
- Anaphylaxis onset may be delayed for several hours after exposure to an allergen. Therefore, until referral pathways to alternate sub-acute pathways are developed, all patients with minor allergy symptoms should be conveyed to the emergency department for assessment.
- Eligible patients may be referred to Urgent and Primary Care Centres using the Minor Allergy assess, see, treat and refer clinical pathway.

General Information

- A minor allergic reaction is caused by an exaggerated immune response to an allergen that results in the degranulation of mast cells and basophils. Release of inflammatory mediators (primarily histamine) from cells in the dermal layer of cutaneous tissue may result in urticaria, erythema, and discomfort.
- Many minor allergic reactions are mediated by immunoglobulin E (IgE) in response to environmental allergens (e.g., insect stings, pollen), but acute urticaria may result from release of inflammatory mediators due to infection or spontaneous activation that is not IgE-mediated in approximately 50% of cases. Regardless of the underlying cause, treatment with antihistamines remains effective.
- Four types of histamine receptors (H1, H2, H3, and H4) are present in the body, with H1 and H2 receptors being the most relevant to minor allergic reactions. First-generation H1 antagonists (e.g., diphenhydrAMINE) cross the blood-brain barrier more

readily and therefore are more likely to have sedative effects. Second-generation H1 antagonists (e.g., loratadine) are equally efficacious to first-generation H1 antagonists. Second-generation H1 antagonists are lipophobic and therefore less able to cross the blood-brain barrier, leading to reduced risk of sedative effects. Caution: first-generation H1 antagonists may cause a decreased level of consciousness with a potential to limit recognition of a progression to anaphylaxis.

- H2 antagonists (e.g., ranitidine) will not independently resolve urticaria but may potentiate the effect of H1 antagonists and should be considered for urticaria causing severe distress.
- H1 antagonists (e.g., diphenhydrAMINE) are not effective in resolving angioedema, cardiovascular, gastrointestinal, or respiratory symptoms in anaphylaxis, and therefore are considered a second-line therapy at best. ***First-line therapy in anaphylaxis remains the administration of epiNEPHrine.***

Interventions

First Responder

- Monitor patient for signs of deterioration into anaphylaxis
  - → E09: Anaphylaxis
- Remove allergen if practical (e.g., scrape off any stinger(s) / wash off topical allergens with soap and water)

Emergency Medical Responder – All FR interventions, plus:

- The patient's personal oral antihistamines may be taken according to manufacturer instructions
- The patient's prescribed inhalers may be taken as directed for known respiratory allergens if required

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider diphenhyDRAMINE to relieve integumentary symptoms and decrease histamine response

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider H2 antihistamine for additional relief of urticaria

Evidence Based Practice

Mild Allergic Reaction

Supportive

- Diphenhydramine

Neutral

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Frigas E, et al. Acute urticaria and angioedema: Diagnostic and treatment considerations. 2009. [Link]
3. Jutel M et al. Histamine, histamine receptors and their role in immune pathology. 2009. [Link]
4. Lin RY et al. Improved outcomes in patients with acute allergic syndromes who are treated with combined H1 and H2 antagonists. 2000. [Link]
5. Randall KL et al. Antihistamines and allergy. 2018. [Link]
6. World Allergy Organization. Allergy to Insect Stings and Bites. 2015. [Link]

Practice Updates

- 2022-02-03: Added Minor Allergy ASTaR information.

E11: Epistaxis

Richard Armour

Updated: December 01, 2021
Reviewed:

Introduction

Approximately 60% of the population will experience at least one or more episodes of nosebleeding, or epistaxis, during their lifetime. Whilst the majority of episodes of epistaxis will be managed by the patient without seeking medical care, the knowledge of appropriate first aid measures to arrest nasal bleeding is low in the general population and so paramedics may be called to assist. Although epistaxis is normally without clear cause, or secondary to digital trauma, some may be related to more severe systemic disease and require careful follow-up by the patient's general practitioner.

Essentials

- The overwhelming majority of patients with epistaxis will respond well to simple first aid measures and these should be optimized before escalation to additional therapies.
- Approximately 95% of patients with epistaxis will have an anterior source of bleeding, if unable to promptly arrest epistaxis consider expeditious transfer for more invasive management in hospital for posterior epistaxis.
- A systematic assessment must be performed to evaluate whether epistaxis is secondary to a worsening of an underlying chronic condition.

Additional Treatment Information

- Appropriate initial first aid measures include:
  - Sitting the patient upright and leaning slightly forward to prevent blood running into the pharynx.
  - Compression of the nose bilaterally just distal to the bridge of the nose for **at least** 15 minutes.
  - A cool cloth or ice pack may be applied to the back of the neck, although the value of this is questionable and should not be prioritized.
- If inserted incorrectly, nasal packing may not address the source of the bleeding, mask ongoing hemorrhage, and may worsen re-bleeding on removal. Paramedics should not generally attempt to pack the nares of patients with epistaxis with gauze, and should convey patients requiring packing to hospital.
- The use of nebulized tranexamic acid remains controversial, and will be re-assessed following the publication of a number of ongoing randomized trials.

Referral Information

- In patients with minor epistaxis without significant risk factors, consider the use of the Epistaxis Assess, See, Treat, and Refer (ASTaR) Pathway.
- Patients who have ongoing bleeding, who are currently receiving oral anticoagulation or antiplatelet therapy, who have experienced recent head trauma, or who have an inherited coagulopathy are at high risk for serious bleeding and conveyance to an emergency department should be recommended.

General Information

- Examples of common antiplatelet and anticoagulation medications which may preclude paramedics from achieving suitable hemostasis include:
  - Warfarin (Coumadin)
  - Factor Xa Inhibitors: Rivaroxaban (Xarelto), Apixaban (Eliquis), Fondaparinux (Arixtra)
  - Anti-Platelet: Clopidogrel (Plavix), Aspirin (ASA), Prasugrel (Effient), Ticagrelor (Brilinta)
- Examples of coagulopathies which may pre-dispose the patient to significant bleeding include: o Hemophilia A and B
  - von Willebrand Disease
  - Advanced liver disease (hepatitis, alcoholic hepatitis)
- Epistaxis may be a presentation of worsening underlying co-morbidities, conduct a thorough review of systems and physical exam

to support decision-making around conveyance and to provide patient with sufficient information to make an informed decision should they refuse conveyance against advice.

Interventions

First Responder

- Position upright, leaning slightly forward to prevent blood running into the pharynx
- Apply direct pressure (manually or with nose clip) to the anterior aspect of the nose, just distal to the bridge of the nose for at least 15 minutes
- Consider a cool cloth or ice pack on the posterior neck as an adjunctive measure

Primary Care Paramedic – All FR and EMR interventions, plus:

- Normal saline to correct hypoperfusion and/or hypotension (systolic BP < 90 mmHg)
  - If no evidence of pulmonary edema, 500 mL bolus up to 2 liters -- reassess BP and lungs every 500 mL
  - Target BP of 90 mmHg systolic
- Consider use of ASTaR pathway for appropriate patients

F01: Altered Levels of Consciousness

Shauna Speers and Mike Sugimoto

Updated: September 29, 2023
Reviewed: September 29, 2023

Introduction

Altered level of consciousness is a common out-of-hospital emergency. Paramedics and EMRs/FRs are frequently faced with patients exhibiting changes to their baseline consciousness, ranging from unconsciousness to hyperarousal. The underlying causes are varied and numerous. Some of these conditions are relatively benign while others are rapidly lethal. Differentiating between these, in the out-of-hospital environment, can be extremely difficult. In assessing and caring for these patients, paramedics and EMRs/FRs should focus on broad goals, such as maintaining a patent airway, supporting oxygenation, ventilation, and circulation. Acknowledging and treating potentially reversible causes must be considered throughout.

Essentials

- Regardless of the underlying cause, patients with altered levels of consciousness are at high risk of functional airway obstruction and hypoxia. Management of oxygenation and ventilation must take priority over a search for potentially reversible causes.
- Syncope should be considered a diagnosis of exclusion. Paramedics and EMRs/FRs must look for reversible or life-threatening causes of unconsciousness and rule these out prior to considering syncope as the cause of the altered level of consciousness.
- The search for reversible causes should be conducted systematically. A number of mnemonics exist to guide paramedics and EMRs/FRs in their investigations. Regardless of which tool is used, paramedics and EMRs/FRs should consider, at a minimum:
  - Alcohol and intoxicants
  - Epilepsy, endocrine (hypoglycaemia), electrolytes
  - Insulin
  - Overdoses, accidental or intentional
  - Underdosing of medication or uremia
  - Trauma
  - Infection
  - Psychosis
  - Sepsis, shock, stroke
  - Hypotension
  - Hypoxia
  - Hypo or hyperthermia
- If a potentially reversible cause is found, refer to the appropriate CPG for management details.

Additional Treatment Information

- All patients with an altered level of consciousness require comprehensive monitoring, including blood glucose measurements, temperature, and a 12-lead ECG.
- Complete a physical exam with specific attention to lateralizing neurological symptoms,
- Patients who have regained consciousness must have a FAST-VAN assessment performed.

Referral Information

Patients who experience syncope are often inclined to refuse service. The diagnostic tests required to safely include or exclude potential causes of syncope or transient loss of consciousness are not available in the out-of-hospital environment. Paramedics and EMRs are expected to follow the appropriate guidelines with respect to these refusals.

General Information

- Syncope is a clinical syndrome in which a transient loss of consciousness is caused by a period of diminished cerebral blood flow. By definition, the duration of the event is usually brief with a spontaneous to normal baseline consciousness. Recovery from syncope is usually rapid and complete with episodes rarely lasting more than a minute or two. Syncope can also be a sign of a potentially serious and life threatening condition. Some patients experience syncope without warning. They lack pre-syncope signs or symptoms and experience a sudden collapse followed immediately by a return to normal mental status. Paramedics and EMRs/FRs should consider these patients to have suffered from a cardiac dysrhythmia until proven otherwise, regardless of vital signs or ECG findings.

- Immediately life-threatening causes of syncope or unconsciousness include:
  - Cardiac dysrhythymias with or without associated ischemia
    - → C01: Acute Coronary Syndrome
    - → C02: Bradycardia
    - → C03: Narrow Complex Tachycardia
    - → C04: Wide Complex Tachycardia
  - Structural heart disease (outflow obstruction or cardiomyopathy)
  - Hypovolemia from occult hemorrhage
    - → D01: Shock
    - → D02: Bleeding
  - Hypotensive distributive shock
  - Pericardial tamponade
  - Pulmonary embolism resulting in obstructive shock
    - → C06: Pulmonary Embolism
  - Hypoglycemia
    - → E01: Hypoglycemia and Hyperglycemia
  - Heat exhaustion and stroke
    - → I02: Hyperthermia
  - Cerebrovascular accidents including TIAs and subarachnoid hemorrhage
    - → F03: Stroke
  - Toxicity from anticonvulsants, beta blockers, calcium channel blockers, benzodiazepines, or narcotic analgesics
    - → J01: Approach to Toxic Exposures
    - → J07: Beta Blockers
    - → J09: Calcium Channel Blockers
    - → J12: Opioids
- Some patients experience syncope without warning. They are devoid of any pre-syncope signs or symptoms and experience a sudden collapse followed immediately by a return to normal mental status. This type of syncope should be considered to be from a cardiac dysrhythmia until proven otherwise, even if the vital signs are normal upon arrival on scene.
- Loss of postural tone is inevitable with a loss of consciousness, resulting in a collapse that can cause traumatic injuries. Longer periods of real or apparent loss of consciousness suggest either an alternative cause, or a concurrent injury that prolongs the syncopal event.
- Patients can have symptoms associated with syncope without loss of consciousness. This is referred to as pre-syncope and should be investigated and managed in the same manner as syncope.
- Vasovagal syncope is a common and benign cause of syncope. It occurs due to an inappropriate response by the autonomic nervous system, typically to triggers such as changes in posture, pain, the sight of blood, or extreme emotional distress. Prodromal symptoms are common and can include a feeling of lightheadedness or dizziness, weakness, nausea, blurred vision, and a general sensation of unwellness or unease. Patients may be pale and diaphoretic. Vasovagal syncope is a diagnosis of exclusion and should be considered only after all potentially serious, life-threatening causes have been ruled out.
  - Bezold-Jarisch Reflex: Common cause of Neuro-cardiogenic syncope (aka, vasovagal syncope)
    - **Adrenergic stimuli (pain/emotion)**
    - --> Exaggerated catecholamine release
    - ↑ Sympathetic tone ++
    - ↑ β1 contractility, before α1 can ↑preload
    - ↑ Ventricular contraction on under-filled chamber
    - ↑ Mechanoreceptor activation from exaggerated contractile force
    - --> Homeostatic vagal tone
    - ↑ Vasodilation / Bradycardia ++
    - --> SYNCOPE

Interventions

First Responder

- Position the patient; if symptoms suggest hypotension, lay flat provided this does not increase symptoms
- If no suggestion of hypotension, place patient in position of comfort
- Maintain airway as required
  - → B01: Airway Management
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Obtain and document capillary blood glucose measurement; correct hypoglycemia if present
    - → E01: Hypoglycemia and Hyperglycemia

Primary Care Paramedic – All FR and EMR interventions, plus:

- Assess for source of syncope
- Monitor for signs of improvement if patient initially hypoperfusing
- Obtain vascular access and correct hypoperfusion
  - → D03: Vascular Access

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Provide advanced airway management if required
- Correct rhythm disturbances

Evidence Based Practice

Syncope

Supportive

- 12-Lead ECG
- Physical counterpressure manuvers

Neutral

- Clinical Decision Making Rule

Against

References

1. Benditt D. Syncope in adults: Clinical manifestations and diagnostic evaluation. In UpToDate. 2019. [Link]
2. Benditt D. Syncope in adults: Epidemiology, pathogenesis and etiologies. In UpToDate. 2019. [Link]

Practice Updates

- 2023-09-29: added glucagon and blood glucose measurement to FR interventions

F02: Seizures

Mike Sugimoto

Updated: December 25, 2023
Reviewed: March 01, 2021

Introduction

A seizure is the result of abnormal and sudden electrical activity in the brain that can be caused by a wide range of conditions. Seizures can be a symptom of an underlying acute medical or neurological condition, or they can lack a clear etiology (as in the case of epilepsy). The main goals of seizure management are to stop the seizure, protect the patient from secondary injury such as aspiration or trauma, evaluate for and treat potentially reversible causes, and provide safe, expeditious conveyance to hospital.

Essentials

- Seizures can be traumatizing for bystanders and family. First-time seizures are particularly disturbing.
- Benzodiazepines are the first line therapy for active seizures.
- Consider important causes of seizures:
  - Hypoglycemia
  - Hypoxia
  - Traumatic head injury
  - Drug overdose, intoxication, or withdrawal
  - Exposure to toxic substances
  - Electrolyte disturbances
  - Cerebrovascular accidents
  - Infections and fevers, including infectious of the central nervous system
- Care more specifically for the patient than the patient's seizures
- For women who are, or who may be pregnant, consider the role of eclampsia
  - → L03: Eclampsia
- For children, see CPG M04 or M12
  - → M04: Pediatrics: Neurological
  - → M12: Neonatal: Neurological

Additional Treatment Information

- Protection of the airway and maintenance of effective oxygenation and ventilation is of critical importance. Profound hypoxia can develop in patients with prolonged seizure activity.
- As a general rule, paramedics should consider controlling seizures in patients who continue to seize after their arrival on-scene. Taking travel time into consideration, these patients are often seizing for upwards of ten minutes by the time an ambulance crew makes contact.
- Patients with known seizure disorders are often prescribed benzodiazepines to be administered by family or caregivers. Paramedics must be aware of this possibility and adjust their dosing strategies accordingly.
- Do not provide prophylactic benzodiazepines to patients who are not currently seizing.
- The duration of the postictal phase is often variable. Patients may exhibit a wide range of behaviors, none of which are intentional and none of which should prompt intervention from law enforcement. Wherever possible, paramedics and EMRs/FRs should provide patients with a quiet, non-stimulating space to recover from their seizure, while protecting them from further harm.

Referral Information

Patients with well-established seizure disorders who experience a single, self-limited seizure, may wish to decline conveyance to hospital.

Consultation with CliniCall is required.

Interventions

First Responder

- Protect the patient from physical harm
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Attempt to place an oropharyngeal airway if required to maintain patency (do not force mouth open)
  - → B01: Airway Management
- Consider Oral 40% Glucose Gel

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain SpO_2 ≥ 94%
  - → A07: Oxygen Administration
- Consider use of nasopharyngeal airway
  - → PR07: Nasopharyngeal Airway
- Consider and search for reversible causes
- Obtain and document capillary blood glucose measurement.
  - Treat hypoglycemia if able without risk to airway management
    - → E01: Hypoglycemia and Hyperglycemia

Primary Care Paramedic – All FR and EMR interventions, plus:

- Treat hypoglycemia
  - → E01: Hypoglycemia and Hyperglycemia
- Consider supraglottic airway device in patients who are no longer seizing but remain profoundly obtunded and require airway management
  - → PR08: Supraglottic Airways
- If indicated as per venipuncture ethical decision making, start IV D03: Vascular Access and Fluid Administration

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- When indicated, control seizures
  - MIDAZOLam intramuscularly; may repeat once if seizures continue and if IV access is unsuccessful
  - Obtain vascular access
    - → D03: Vascular Access
  - If seizures continue, MIDAZOLam intravenously; may repeat every 2-5 minutes as required
  - Modify doses for smaller/elderly individuals
  - CliniCall consultation recommended to discuss additional dosing instructions.
- Consider intubation or advanced airway management for seizures refractory to treatment or continued profound unconsciousness
  - → B01: Airway Management

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Attempt to arrest seizures with anticonvulsants; consider:
  - Benzodiazepines (MIDAZOLam)
  - Propofol
  - Ketamine
  - Call ETP prior to initiating antiepileptic
    - Levetiracetam
    - PhenyTOIN
    - Phenobarbital
- In unstable patients refractory to conventional treatments, consider the use of a neuromuscular blockade and intubation to maintain physiologic norms
  - Call ETP prior to paralysis treatment.
  - Consider evaluating serum electrolytes in searching for underlying (and potentially treatable) causes

- Secure airway if required
    - → PR18: Anesthesia Induction
    - → PR29: Mechanical Ventilation

Evidence Based Practice

Seizure (Adult)

Supportive

- Diazepam-IV
- Lorazepam-IV
- Midazolam-IM
- Diazepam-IM
- Diazepam-PR
- Lorazepam-IM
- Midazolam-IV
- Status epilepticus scale
- Midazolam-IN
- Propofol

Neutral

Against

F03: Stroke

Marc-Andre Gessaroli

Updated: November 14, 2023
Reviewed: November 14, 2023

Introduction

An acute stroke is a sudden non-traumatic ischemic or hemorrhagic insult to the brain. Transient ischemic attacks (TIAs) are events that present similarly to an acute ischemic stroke, but resolve completely and spontaneously within minutes to hours. Despite the resolution of symptoms, TIAs are important warning signs that indicate a patient is at high risk for ischemic stroke. The main goals of care include rapid and accurate recognition of stroke symptoms, establishing the time of symptom onset (or the 'last seen normal' time, as applicable), and timely conveyance to an appropriate stroke centre.

Essentials

- To minimize mortality and disability, effective stroke management involves multiple providers and a system of care. Early recognition, appropriate clinical pathway selection, and communication are all essential.
- Apply the FAST-VAN exam as part of patient assessment.
  - → Tool: FAST-VAN calculator
- Patients with suspected acute stroke and TIAs should be preferentially conveyed to stroke care centres or to an emergency department with CT imaging capabilities.
- 'Hot stroke' patients are defined as those with a positive FAST screening score and an onset of symptoms within the last six hours, or who woke up with symptoms.
- 'Hot stroke' patients whose VAN exam is positive may have a large vessel occlusion that benefits from endovascular thrombectomy (EVT). Regional guidelines or clinical pathways may direct these patients to a particular centre with EVT capabilities.
- Approximately 15% of all strokes are the result of an intracranial haemorrhage (ICH). These patients are more likely to deteriorate rapidly despite aggressive out-of-hospital care.

Additional Treatment Information

- A negative FAST-VAN exam does not exclude a stroke.
- Paramedics and EMRs/FRs should suspect a hemorrhagic stroke in patients who present with stroke symptoms and:
  - Glasgow Coma Score < 10
  - A history of severe headache
  - Nausea and vomiting
  - Bradycardia and hypertension
  - Unequal pupils
  - Abnormal respiration patterns

Referral Information

Resolved TIAs require conveyance to an appropriate stroke centre or emergency department for further evaluation. Use an appropriate clinical pathway where available:

- Fraser Health:
  - Surrey to Royal Columbian CT
  - Fraser East
- Vancouver Coastal:
  - Vancouver and Richmond
  - North Shore and Sea-to-Sky
- Island Health:
  - Victoria and South Island
  - Southern Gulf Islands

- Interior Health:
  - South Okanagan

Interventions

First Responder

- Place in a position of comfort if possible; otherwise, position as necessary for care
- Manage airway as required
  - → B01: Airway Management
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Obtain and document capillary blood glucose measurement; treat hypoglycemia with oral glucose as patient's condition permits
  - → E01: Hypoglycemia and Hyperglycemia
  - Oral 40% Glucose Gel
- Obtain and document onset of symptoms or 'last seen normal' time
- Minimize on-scene time
- Notify receiving facility while en route

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access:
  - → D03: Vascular Access and Fluid Administration
  - Select a site above the level of the wrist using a size 18 G, preferably on the right side
- Enrol in FRONTIER trial if indicated and within study area. **EPOS consultation via CliniCall is mandatory** prior to enrolling patients in FRONTIER trial (do not open medication until authorization received).

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Anesthesia:
  - Phase 1
    - Secure airway if required; use an appropriate induction strategy and intubation procedure based on patient and environment specificity
    - Call ETP prior to paralytic administration.
      - Post-call consultation permitted for RSI in emergency situations
  - Phase 2
    - Deep sedation is required; target RASS 5 without complete or burst suppression
    - Propofol is the preferred agent for phase 2 anesthesia
    - Use narcotic analgesia as required
    - Use EEG-guided anesthesia if appropriate
    - Maintain neuromuscular blockade as required
    - Call ETP prior to paralytic administration.
      - Post-call consultation permitted for RSI in emergency situations
- Manage hemodynamic instability:
  - Target MAP > 65 mmHg and systolic blood pressure > 90 mmHg
  - Crystalloid and/or vasopressor administration may be required
  - Consider short term phenyLEPHRine administration
  - For long term support, consider NORepinephrine
  - For suspected intracranial hemorrhage or subarachnoid hemorrhage in the unconscious patient, maintain blood pressure < 160 mmHg:

        - Consider LABETalol
        - Consider hydrALAzine
- Optimize cerebral venous out-flow:
    - Raise head of bed to 30° (Unless the CVA is thrombo-embolic in nature with severe carotid stenosis then keep flat and supine.)
    - Promote venous drainage (e.g., loosen cervical collars, ETT ties loose, trans-pulmonary PEEP of 0 cmH_2O, trans-pulmonary plateau pressure < 25 cmH_2O)
    - Maintain neck neutrality
    - If no esophageal balloon in place, set PEEP 5-12 cmH_2O
    - Decompress stomach if required
- Mechanical ventilation strategies:
    - BVM with PEEP valve: maintain adequate oxygenation while preserving adequate cerebral venous drainage
    - Ensure oxygenation goals are being met (SpO_2 > 97%, PaO_2 100-150 mmHg)
    - Ensure ventilation goals are being met ($EtCO_2$ 35-40 mmHg, $PaCO_2$ 35-40 mmHg)
    - Minimize Pplats while maintaining ventilation goals
- Control seizure activity:
    - Consider etiology and patient presentation when selecting appropriate agent:
        - MIDAZOLam
        - KetAMINE
        - Propofol
    - Consider the side effect of hypotension: pressors may be required to maintain hemodynamic goals
    - Consider the utility of phenyTOIN or phenobarbital for seizing and seizure prophylaxis; treat based on the etiology, patient presentation, requirement for neuromuscular blockade, and conveyance context
- Monitor for signs of raised ICP and cerebral herniation:
    - EVD monitoring
    - Call ETP for EVD consult
    - Neurological exam findings:
        - Unilateral pupillary dilation considered to be related to a rise in intracranial pressure
        - Decorticate or decerebrate posturing
        - Seizure activity
        - ONSD of < 6 mm
    - Consider osmotic therapy:
        - Hypertonic saline
        - Call ETP prior to administration of hypertonic saline.
        - Mannitol
    - Consider nimodipine for reduction in vasospasm
- Maintain capillary blood glucose between 6-10 mmol/L
- Arterial or venous blood gas analysis:
    - Adjust mechanical ventilation to ensure adequate oxygenation, appropriate ventilation, and safe ground ventilating parameters
- Consider anti-emetic administration:
    - DimenhyDRINATE
    - Metoclopramide
    - Ondansetron
- Other considerations:
    - Avoid steroid use
- In the context of hemorrhagic stroke and the patient on anticoagulation
    - Consider prothrombin complex concentrate

Neurological emergencies or urgencies are time sensitive and may require immediate intervention. Minimizing scene times may have significant effects on patient outcomes.

Evidence Based Practice

Stroke-CVA-TIA

Supportive

- Advanced Notice/ Optimal Trip Destination
- Mobile Stroke unit
- Drip and ship
- HEMS
- Stroke Diagnosis Scales (any)
- Stroke scale: CPSS
- Stroke scale: LAMS
- Stroke scale: RACE
- 12-Lead ECG

Neutral

- ASA/Aspirin
- Magnesium
- Blood Glucose Control
- Hypertension Control

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]

F04: Headache

Joe Acker

Updated: June 07, 2021
Reviewed: March 01, 2021

Introduction

Headache is a generalized term given to any pain in the region of the head above eye level. Pain from headaches can be acute or chronic, generalized or localized, and can range from mild to severe. The pain may occur on one or both sides of the head, be isolated to a single location, or extend as a band across the skull. Paramedic and EMR/FR assessment of a patient with a headache should include a detailed history followed by a thorough general and neurological examination. The underlying cause of the pain cannot be diagnosed in the out-of-hospital setting and conveyance to hospital is usually required.

Essentials

- Acetaminophen is an effective first-line analgesic for managing headaches in the out-of-hospital environment.
- Nitrous oxide is considered safe and may be effective for managing headaches.
- Treat nausea and vomiting as required.
- Paramedics and EMRs are not to administer acetylsalicylic acid for headache.
- Opioids are of limited benefit in the treatment of migraines. MORPHine may not be effective and may be associated with delayed recovery. FentaNYL should only be used to treat severe headache where other measures have failed and where conveyance to the treating facility is prolonged.

Additional Treatment Information

- Severe dehydration may cause headaches. IV fluid replacement may be beneficial in these cases.
- Analgesia may not be effective in patients who suffer from previously diagnosed cluster headaches. High flow oxygen may be beneficial in these cases.

Referral Information

Headache management depends upon in-hospital diagnosis; this cannot take place in the out-of-hospital environment. Paramedics and EMRs must provide interim symptom relief until a definitive diagnosis can be made and appropriate management plan developed. Patients who suffer from migraine or chronic headaches may have a pre-defined treatment plan and will seek care only when that plan has failed or the presentation of the headache is new or unusual.

General Information

- The common types of headache include:
  - Vascular
    - Migraines and cluster headaches
    - Can last from minutes to days
    - Characterized by intense/throbbing pain, photosensitivity, nausea, vomiting, and sweating
    - Sudden onset/most severe ever headache (thunderclap) may indicate subarachnoid hemorrhage
  - Tension
    - Often starts in the morning as mild and worsens throughout the day
    - Characterized by a dull, achy pain
  - Organic
    - Less common
    - Caused by tumours, infection, or other diseases of the brain
- Headaches can be a minor inconvenience or may be debilitating. Occasionally a serious medical emergency may present with headache as a symptom. These include:
  - Subarachnoid hemorrhage
    - Sudden onset, severe, instantaneously peaking headache (a 'thunderclap' headache)
  - Hemorrhagic strokes

        - Onset of a sudden and severe headache
    - Other vascular eitiologies
        - Giant cell arteritis, carotid or vertebral artery dissection, venous thrombosis
    - Meningitis
        - Continuous throbbing headache (usually in occiput) with sudden onset of fever, nausea, vomiting, confusion, and stiff neck
        - Frequently associated with a rash which may be maculopapular, petechial, or urticarial
        - A decreased headache secondary to the administration of metoclopramide is not diagnostic in nature; do not make further treatment or conveyance decisions based solely on a response to the medication
        - Paramedics and EMRs/FRs should use droplet precautions if meningitis is suspected
    - Acute angle-closure glaucoma
        - Headache with severe pain to ipsilateral eye with associated visual changes or visual loss
    - Carbon monoxide toxicity

Interventions

First Responder

- Place patient in position of comfort; the patient may be more comfortable if the environment can be made dark/dim and quiet
- Manage airway as required
    - → B01: Airway Management
- Supplemental oxygen as required
    - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Consider analgesia
    - → E08: Pain Management

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access:
    - → D03: Vascular Access
    - Consider volume replacement for dehydration
- Consider analgesia for symptom relief:
    - Nitrous oxide
    - Acetaminophen
- Consider antiemetic for symptom relief:
    - DimenhyDRINATE

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider analgesia for severe pain:
    - FentaNYL

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Investigations to address and treat underlying etiology
- Consider NSAIDS
    - Ketorolac
    - Acetaminophen
- Consider opioid
    - Hydromorphone
    - Morphine
- Other medications (Ondansetron, Metoclopramide)

Evidence Based Practice

Headache-Migraine

Supportive

- Ketamine
- Metoclopramide
- Metoclopramide plus diphenhydramine
- Nitrous Oxide
- NSAIDs

Neutral

- Acetaminophen IV
- Oxygen
- Fluid Bolus

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. Queensland Ambulance Service. Clinical practice guidelines: Neurological/headache. 2017. [Link]

G01: Extreme Agitation and Excited Delirium

Jon Deakin

Updated: November 05, 2023
Reviewed: November 05, 2023

Introduction

This guideline applies to patients who present with extreme agitation or aggressive and violent behaviour. It is intended to provide protection for both patients and responders in circumstances where there is a high risk of violence. Chemical sedation is to be used when the patient is a risk to themselves or others and cannot be safely managed through other means. **It should be applied judiciously and with sound clinical judgment.**

Paramedic and EMR/FR safety is paramount at all times. Ensure that sufficient and necessary assistance is available prior to administration of sedation. Clear communication with all parties involved in restraining the patient will help reduce the risk of injuries.

Sedation may allow for a safer conveyance and provide an earlier opportunity for hospital staff to evaluate the patient. In communities where they are available, Advanced Care Paramedics should be considered as a resource to assist in the safe conveyance of these patients.

In communities where advanced care is not available, do not approach a violent patient: call for police to assist in restraining and securing the patient.

Essentials

- Consider and treat underlying causes
  - Hypoxia
    - → A07: Oxygen Administration
    - → B01: Airway Management
  - Hypoglycemia
    - → E01: Hypoglycemia and Hyperglycemia
  - Head injury
    - → H03: Head Trauma
  - Drug actions or withdrawal
  - Infection (pneumonia, sepsis)
    - → K02: Sepsis
  - Electrolyte imbalances
- IM ketamine is the preferred drug in the management of severely agitated patients and in excited delirium syndrome (ExDS) because of its faster onset, shorter duration, superior efficacy, and fewer side effects compared to midazolam.
  - Administer 4-5 mg/kg IM
  - Administration may require two or more IM injections
  - Maximum volume for Adult IM injections:
    - Deltoid 2.0 mL
    - Lateral thigh 4.0-5.0 mL
    - Larger Muscles (Gluteal) 5.0 mL
  - Additional administration of midazolam is usually not indicated but may be given if maintenance of sedation is required.

Additional Treatment Information

Warning: Sudden cessation of resistance or verbalization under restrained circumstances can represent a cardiorespiratory emergency. Patient advocacy is critical in this situation and a rapid evaluation of patient vital signs is imperative. Immediate resuscitation may be required.

- Sudden death in patients presenting with ExDS have been associated with being restrained in the prone position. If it is necessary to place the patient prone to gain control, monitor the airway and vital signs closely and always move the patient to a supine or ¾ prone position as soon as possible.
- Prolonged physical struggle, multiple deployments of conducted energy weapons, posterior pressure restraint (e.g., prone position, neck pressure, posterior chest pressure), and unremitting physical resistance are risk factors for rapid cardiovascular collapse.

- Record the Richmond Agitation Sedation Scale (RASS) score pre- and post-ketamine administration.
  - → Richmond Agitation Sedation Scale
- Hypersalivation is a known side effect of ketamine. On most occasions, suctioning will be sufficient. If hypersalivation becomes difficult to manage or the airway becomes compromised, treatment may include administration of atropine.

Referral Information

All sedated patients must be conveyed to an emergency department for observation.

General Information

- Patients presenting with ExDS often experience a collection of symptoms:
  - Require emergent sedation
  - Include a history of drug use and/or psychiatric illness☐
  - Are males with a mean age of 35 years☐
  - Experience hyperthermia☐
  - Experience severe metabolic acidosis☐
  - Display shouting and paranoia/panic
  - Show violence towards others
  - Are insensitive to pain
  - Exhibit unexpected physical strength and endurance
  - Present with bizarre and/or aggressive behaviour
  - Display constant or near constant physical activity
  - Form unintelligible words
- Delirium:
  - Rarely requires emergent sedation
  - Is characterized by an acute onset with changing severity of confusion, disturbances in attention, disorganized thinking, and/or a decreased level of consciousness☐
  - Has an onset over hours to days☐
  - Is often worse at night☐
  - Is accompanied by fluctuating emotions like sudden outbursts, anger, crying, or fear☐
  - Can co-exist with dementia☐
- Dementia:
  - Does not require emergent sedation
  - Is characterized by a gradual and progressive decline in mental processing ability that affects short-term memory, language, communication, judgment, and reasoning☐
  - Has a gradual onset over months to years☐
  - Frequently presents with depression and apathy

Interventions

First Responder

- Await police restraint if indicated
- Position the patient 3/4 prone if possible; be aware of the risks of positional asphyxia
- Ensure effective respirations
- Provide supplemental oxygen as required and if safe to do so
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Monitor vital signs closely, including temperature
- Correct hypoglycemia
  - → E01: Hypoglycemia and Hyperglycemia

        - Glucose 40% Oral Gel
- If conveyance is necessary, do not restrain patient in prone position
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Correct hypoglycemia
    - Glucagon
- Consider vascular access
    - → D03: Vascular Access
        - Dextrose

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Attach cardiac monitor as soon as clinically practical
- Intervene in cases of agitation, aggression, or behavioural emergency
    - Complete RASS assessment before and after medication administration
    - If RASS +4: KetAMINE intramuscularly
    - If RASS +2-3: MIDAZOLam intramuscularly or intravenously as required
- Consider a single dose of atropine if salivation becomes unmanageable with suctioning.

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider antipsychotics (haloperidol)
    - Call ETP prior to antipsychotic agent administration.

Evidence Based Practice

Violent-Agitated

Supportive

- Antipsychotics (Atypical)
- Antipsychotics (Typical)
- Benzodiazepines
- Ketamine
- Loxapine

Neutral

Against

- Field Restraint Devices

References

1. Alberta Health Services. AHS Medical Control Protocols. Published 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]

G02: Mental Health Conditions

Phil Yoon and Mike Sugimoto

Updated: May 26, 2021
Reviewed: March 01, 2021

Introduction

A mental health condition is characterized by: a varying degree of disorder of thought, orientation, or mood perception; memory deficits that cause significant impairment of judgment; altered capacity to recognize reality; or the inability to complete activities of daily life. Patients that suffer from depression, anxiety disorders, schizophrenia, bipolar disorder, or a situational crisis may experience an acute psychiatric episode.

A number of socioeconomic factors and stressors derived from personal, social, economic, toxicological, and geographic issues can play significant exacerbating roles to underlying mental health conditions.

Patients with mental health disorders must be treated with respect, understanding, empathy, and patience.

Essentials

Never assume patients with mental health conditions do not have a legitimate medical complaint.

- Ensure safety at all times. Continually reassess the environment for changing risk factors. Identify dangers for paramedics and EMRs/FRs, patients, and bystanders. Be prepared to rapidly vacate the scene if necessary.
- Consider underlying causes of abnormal behaviour: see F01: Altered Levels of Consciousness.
- High-risk symptoms necessitating paramedic or EMR/FR intervention include: suicidal ideation; self-harm behaviours; intentional overdose or poisoning; abnormal cognitive impairment; or altered perceptions (e.g., hallucinations or delusions).
- Patients with mental health conditions who are intoxicated or cognitively impaired may not be capable of making informed decisions about their own care.

Additional Treatment Information

- Carefully consider a history of illness and search for underlying diseases or processes that might result in the abnormal behaviour. Carbon monoxide poisoning, hypoglycemia, hypoxia, head trauma, endocrinological conditions, and seizures may produce mental health-like symptoms.
  - → E01: Diabetic Emergencies
  - → F02: Seizures
  - → J02: Carbon Monoxide
- For patients expressing suicidal ideation or thoughts, the degree of suicidality may be reflected by previous suicide attempts, suicide planning (such as notes or a preconceived method of harm), and a lack of future orientation.
- If the scene becomes unsafe at any time, withdraw immediately and seek additional resources. Do not re-engage with the patient or bystanders unless police are in attendance. Violent or extremely agitated behaviour from a patient is inherently high-risk: these patients must be evaluated in a hospital.
- For patients with altered levels of consciousness:
  - → F01: Altered Levels of Consciousness
- For severely agitated patients, consider chemical restraint.
  - → G01: Extreme Agitation and Excited Delirium

Referral Information

General Information

- The probability of a successful outcome is increased significantly if paramedics and EMRs/FRs exercise patience and work collaboratively with patients, their families, and any other care providers at the scene.

- Assessment of patients with behavioural symptoms must include the following elements:
  - Level of consciousness
  - Attention
  - Memory
  - Cognition
  - Affect and mood
  - Current socioeconomic situation
- Competent patients retain the right to refuse conveyance or treatment. Patients are not considered competent if:
  - They are likely to cause harm to themselves
  - They are likely to cause harm to others
  - They are significantly disabled due to an acute illness or injury
  - They are intoxicated due to alcohol or drugs
  - They are unable to answer or complete any of the following questions:
    - What is your name?
    - Where are you right now?
    - What day is it?
  - CliniCall consultation required if a patient is deemed competent but still represents a significant risk of harm to self or others and is declining conveyance to hospital (1-833-829-4099).
  - Section 28 of the British Columbia *Mental Health Act* empowers law enforcement officers to apprehend and convey a patient to be formally evaluated by a physician, if in the officer's opinion the patient:
    - Is acting in a manner likely to endanger that person's own safety, or the safety of others, and;
    - Is apparently a person with a mental disorder.
  - The officer does not have to personally observe the patient's behaviour. The officer may act on information obtained from family members, health professions, or others.

Interventions

First Responder

- Establish safety of personnel and the patient
- Verbally attempt to de-escalate situation and offer reassurance
- Facilitate enacting the patient's care plan if available
- Conduct a full history and physical assessment required to rule out underlying medical conditions

Emergency Medical Responder – All FR interventions, plus:

- CliniCall consultation required if a patient is deemed competent but still represents a significant risk of harm to self or others and is declining conveyance to hospital.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- For patients with non-combative anxiety, consider:
  - MIDAZOLam
  - ECG acquisition to rule out rhythm or ischemic abnormalities
    - → PR16: 12-Lead ECG
  - Vascular access
    - → D03: Vascular Access

Evidence Based Practice

Depressed Suicidal

Supportive

- Field medical clearance

Neutral

Against

H01: Principles of Major Trauma

Adam Greene and Scott Haig

Updated: May 25, 2021
Reviewed: March 01, 2021

Introduction

Trauma is one of the leading causes of death worldwide. In Canada, trauma is the leading cause of death in people under age 45 and accounts for approximately 16,000 deaths per year. Despite advances in trauma resuscitation, hemorrhage, shock, and coagulopathy remain the main drivers of preventable death after trauma and are responsible for over 40% of all trauma-related deaths.

Initiation of "damage control resuscitation" in the out-of-hospital environment has the potential to reduce complications associated with hemorrhage by intervening at the point of injury and preventing or limiting the development of 'Acute Coagulopathy of Trauma-Shock' (ACoTS). Adopted from damage control surgery, damage control resuscitation prioritizes rapid definitive hemorrhage control, permissive hypotension (in select patients), the minimal use of crystalloid fluid, and timely delivery of balanced blood products.

Essentials

- Rapidly obtain definitive hemorrhage control.
- Maximize tissue oxygenation.
- Prevent or limit the development of hypothermia.
- Minimize the use of crystalloid fluid for volume replacement.
- Initiate rapid conveyance to an appropriate lead trauma hospital or utilize clinical pathway.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.

General Information

- Assessment and stabilization should follow the CABCDE pattern: Circulation, airway, breathing, circulation, disability (neurologic status), exposure.

Interventions

First Responder

- Control external bleeding
  - → D02: Bleeding
  - → PR03: Tourniquets
  - → PR04: Wound packing
- Control suspected internal bleeding
  - → PR02: Pelvic Binders
- Consider spinal motion restriction based on clinical indications
- Provide appropriate airway management
  - → B01: Airway Management
- Prevent further heat loss
- Supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Consider Auto Launch or Early Fixed Wing Activation; convey urgently

- Consider intercept with additional resources
- Consider analgesia as needed
  - → E08: Pain Management

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider IV access with minimal use of crystalloid fluid
  - → D03: Vascular Access
- Consider permissive hypotension in select patients
  - → D01: Shock
- Control suspected internal bleeding
  - Tranexamic acid in cases of shock secondary to blood loss and occult bleeding secondary to hypovolemia

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider IV/IO access
  - → PR12 Intraosseous Cannulation
- Consider anesthesia planning and intubation as required
  - → PR18: Anesthesia Induction
- Consider analgesia as needed
  - → E08: Pain Management

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider point of care ultrasound (POCUS)
- Consider advanced anesthesia planning
- Consider balanced blood product resuscitation

Evidence Based Practice

General Major Trauma Care

Supportive

- Acetaminophen IV
- Fentanyl
- Morphine
- Nitrous Oxide
- NSAIDs
- ALS
- Blood Glucose Monitoring
- ETCO2
- HEMS
- Ketorolac (Toradol)
- Mechanical Intraosseous Insertion
- Optimal Trip Destination
- Point of Care Lactate
- Trauma Team Activation
- Acetaminophen PO

Neutral

- Ketamine
- Thermostasis

- Oxygen
- IV access
- Manual Intraosseous Insertion
- Temperature Monitoring

Against

- Benzodiazepines

H02: Crush Injuries

Tom Zajac

Updated: September 28, 2022
Reviewed: March 01, 2021

Introduction

Crush injuries result from the entrapment of body parts by compressive forces, resulting in physical trauma and ischemia to tissues. These injuries are most commonly discussed in the context of collapsed structures, though crush injuries can occur even from a patient's own body weight.

If significant muscle mass is involved, crush syndrome can develop following the release of the compression; this is a potentially life-threatening, systemic condition. The major factors that lead to the development of crush syndrome include the degree of compressive force, the amount of muscle mass involved, and the duration of the compression.

The onset of crush syndrome occurs following the reperfusion of the injured muscle upon release. This may have both acute and delayed-onset clinical effects. The three main acute concerns are electrolyte imbalances, which may result in cardiac dysrhythmias (predominantly hyperkalemia), hypovolemia, and metabolic acidosis, all of which can cause shock. The delayed-onset effects include renal failure, acute respiratory distress syndrome, coagulopathies, and severe sepsis.

Delayed medical care or inappropriate rescue management, such as the uncontrolled and rapid removal of the compressive force prior to intervention, may result in rapid clinical deterioration and death of the patient.

Essentials

- Pre-treatment of crush injury prior to release of forces is essential. Failure to treat can result in death.
- On advice of CliniCall, begin aggressive fluid management (see PCP interventions below).
- Electrolyte and dysrhythmia management should be undertaken as per license level.
- Provide analgesia as appropriate.

Additional Treatment Information

- Paramedics and EMRs/FRs should consider the possibility of other concurrent injuries beyond the crush, particularly hypothermia and other potential causes of shock.
- Crush injuries that occur in industrial settings, or in the context of a structural collapse or other disasters, can come with significant hazards for rescuers. Scene safety is paramount – consider the risks of confined spaces, carbon monoxide, hypoxic environments, or toxic atmospheres.
- Additional out-of-hospital resources should be sought early.

Referral Information

All patients with crush injuries should be conveyed to the closest appropriate trauma receiving hospital as per local trauma destination guidelines or clinical pathway.

General Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations

Interventions

First Responder

- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Consider hypothermia; protect patient from environment; consider thermal protection, insulation from cold surfaces, and warming blankets as available/appropriate

- Consider application of a tourniquet proximal to the injury site on the extremity, prior to release of the crush force
  - → PR03: Tourniquets

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain SpO2 ≥ 94%
  - → A07: Oxygen Administration
- Coordinate lift with treatments
- ClinCall consultation recommended prior to tourniquet application and to discuss care planning options.
- Consider waiting until higher licensed paramedic is on scene; prepare for cardiac arrest on release of weight
- Manage pain
  - → E08: Pain Management

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access where possible
  - → D03: Vascular Access
- Consider administering normal saline 2 L immediately prior to release of crush force
  - ClinCall consultation recommended prior to fluid administration and to discuss care planning options.
- Consider continuous salbutamol therapy
  - ClinCall consultation required prior to salbutamol administration and to discuss care planning options.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain vascular access where possible
  - → PR12: Intraosseous Cannulation
  - → PR13: External Jugular Cannulation
- Correct electrolyte disturbances
  - Calcium chloride
  - Sodium bicarbonate
    - ClinCall consultation required prior to administration of sodium bicarbonate.
  - Caution: sodium bicarbonate and calcium chloride cannot be administered at the same time through the same IV/IO line

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Induce paralysis and facilitate ventilation if required; use rocuronium for paralysis – succinylcholine is contraindicated in crush syndrome
- Intravenous dextrose and insulin (IFT to tertiary care on advice of ETP/EPOS)
- Mannitol 20%: may be considered once ongoing urinary production and output has been verified (IFT to tertiary care on advice of ETP/EPOS; mannitol is contraindicated in anuric states
- Kayexelate – sodium polystyrene sulfonate (when practical and if prolonged ITF transfer to tertiary care is expected on advice of ETP/EPOS)

Evidence Based Practice

General Major Trauma Care

Supportive

- Acetaminophen IV
- Fentanyl
- Morphine
- Nitrous Oxide
- NSAIDs
- ALS
- Blood Glucose Monitoring
- ETCO2

- HEMS
- Ketorolac (Toradol)
- Mechanical Intraosseous Insertion
- Optimal Trip Destination
- Point of Care Lactate
- Trauma Team Activation
- Acetaminophen PO

Neutral

- Ketamine
- Thermostasis
- Oxygen
- IV access
- Manual Intraosseous Insertion
- Temperature Monitoring

Against

- Benzodiazepines

Limb Amputation/Mangled/Major Hemorrhage

Supportive

- Hemostatic dressing
- Pre-alert (massive transfusion protocol)
- Tourniquet (limb)

Neutral

- Direct Pressure
- Tourniquet (junctional)

Against

Extremity Trauma

Supportive

- Antibiotic (open fracture)

Neutral

- Procedural Sedation

Against

References

1. International Search And Rescue Advisory Group. The Medical Management of the Entrapped Patient with Crush Syndrome. 2012. [Link]

Practice Updates

- 2022-09-28: changed salbutamol to requiring consultation prior to administration

H03: Head Trauma

Mike Sugimoto

Updated: March 08, 2024
Reviewed: March 01, 2021

Introduction

In the out-of-hospital environment, paramedics and EMRs/FRs can encounter three different types of head injuries: scalp injuries; cranial fractures; and traumatic brain injuries. These can occur in isolation, but are commonly associated with each other and are the result of blunt or penetrating trauma to the head. Head injuries are the most common cause of death and severe disability in trauma. Immediate post-injury management can have a profound effect on the patient's long-term prospects for both survival and recovery.

Essentials

- Hypoxia and hypotension, in conjunction with traumatic brain injury, are universally lethal conditions. It is imperative that paramedics and EMRs/FRs work to maintain a normal blood pressure and oxygen saturation.
- Use intravenous fluids to target a mean arterial pressure of at least 80 mmHg (or a systolic blood pressure of at least 110 mmHg).
- Patients must not be hypo- or hyperventilated; paramedics and EMRs/FRs must take all appropriate measures to protect the airway and ensure adequate oxygenation and ventilation at all times, up to and including supraglottic airway devices and endotracheal intubation.
- Seizures and vomiting are common complications of head injuries. Prepare to intervene as necessary.
- Except in the case of isolated penetrating trauma, head injuries are seldom isolated. Identify and manage other injuries concurrently.

Additional Treatment Information

- Select conveyance destinations in accordance with provincial and local trauma triage guidelines or clinical pathway. In general, convey patients to facilities that have neurosurgical capabilities. Consider the use of Autolaunch or Early Fixed-Wing Activation where appropriate.
- Endotracheal intubation in head injuries remains fraught. The risk of hypotension and hypoxia in the peri-intubation period is significant and adversely affects mortality. Paramedics electing to intubate patients with traumatic brain injuries must choose an induction strategy with those goals in mind.
- Moderate to severe traumatic brain injuries are often accompanied by injuries to other parts of the body. In these cases, other injuries must not be neglected.
- Temperature control of patients with traumatic brain injuries can be challenging. Although the hazards of hypothermia in the context of trauma are relatively well understood, the injured brain is at equal risk from hyperthermia. Patients should be kept normothermic. If the patient is, or becomes hyperthermic, passive heat loss should be promoted. Do not undertake active cooling.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.
- All patients with head trauma should be conveyed to the closest appropriate trauma receiving hospital as per local trauma destination guidelines or clinical pathway.

General Information

- Traumatic brain injuries can be further classified based upon the degree of disability, as measured by the Glasgow Coma Scale:
  - A GCS $\geq$ 13 is indicative of mild injury
  - A GCS that falls between 9 and 12 is suggestive of a moderate injury
  - A GCS $\leq$ 8 is defined as a severe traumatic brain injury
- "Concussion" is a term that has been used synonymously with "mild traumatic brain injury" but more accurately describes the signs and symptoms experienced by an individual who has suffered a mild traumatic brain injury.

- Signs and symptoms of a concussion include, but are not limited to: grossly observable loss of coordination; vacant stare; disorientation; delayed or difficult responses to questions; slurred speech; inappropriate emotional responses; and memory deficits. Headache, dizziness, nausea, and vomiting are common. These symptoms may immediately follow the traumatic injury or may take hours to fully evolve.
- Differentiating between mild traumatic brain injuries that require imaging and hospital evaluation and those that do not is extremely difficult in the out-of-hospital environment and carries significant risk for paramedics and EMRs/FRs. Therefore, as a general rule, patients who are "concussed" – who have experienced an alteration in mental status that may not necessarily be associated with a loss of consciousness – should be conveyed for further evaluation.

- Scalp lacerations are associated with extensive bleeding because the blood vessels of the scalp lack the ability to vasoconstrict as effectively as elsewhere in the body. Direct pressure is usually sufficient to control these types of wounds. but awareness needs to be undertaken as open scalp wounds are occasionally the only indication of deeper, more serious injuries.
- Caution should be exercised in elderly patients or individuals taking anticoagulant medications: relatively minor mechanisms of injury can cause significant (and catastrophic) hemorrhage that may be undetected during the initial assessment.
- The skull is a relatively strong body part and so cranial injuries, including basilar skull fractures, require a significant amount of force. Battle's sign is a late finding in these patients; its absence does not exclude the possibility of a basilar skull fracture.
- Cerebral herniation is a complication of traumatic brain injury where the rising intracranial pressure begins to push the cerebrum caudally, obstructing the flow of cerebrospinal fluid and compressing the brainstem. Signs include a falling level of consciousness, unilateral pupil dilation and lateral-inferior deviation of the eye on the affected side, paralysis of the arm and leg on the opposite side, and decerebrate posturing. Patients may yawn, sigh, take intermittent deep breaths, or progress to Cheyne-Stokes respirations.
- Trismus is commonly seen following severe traumatic brain injuries. In the majority of cases, these patients can be effectively ventilated using good bag-valve mask techniques, though suctioning can be difficult and adjunct placement may be impossible.
- Mean arterial pressure can be calculated by the formula ([DBP x 2] + SBP) / 3, and is in general a more meaningful measure of cerebral perfusion than systolic blood pressure alone.

Interventions

First Responder

- Protect and maintain the patient's airway; consider potential for vomiting based on level of consciousness; provide supplemental oxygen as required
  - → A07: Oxygen Administration
  - → B01: Airway Management
- Control external bleeding
  - → D02: Bleeding
- Consider spinal motion restriction based on mechanism of injury and physiological abnormalities

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain SpO_2 ≥ 94%
  - → A07: Oxygen Administration
- Where possible, elevate head to 30 degrees from horizontal
- Avoid obstructing venous return in the neck: loosen cervical collars; ties; or other mechanical obstructions around the neck
- Initiate conveyance; consider intercept with additional resources
- Measure capillary blood glucose sample

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access
  - → D03: Vascular Access
- Maintain blood pressure; target MAP of 85-90 mmHg (or systolic blood pressure of 120 mmHg); do not exceed 2 L total volume fluid administration
- Correct hypoglycemia only if present:
  - → E01: Hypoglycemia and Hyperglycemia
  - Dextrose intravenously; target > 4 mmol/L; do not exceed 12.5 g total dextrose and do not use D10W as primary line or for medication administration

- Consider antiemetic
  - → E07: Nausea and Vomiting
- Consider supraglottic airway device if needed to protect airway or facilitate ventilation
  - → PR08: Supraglottic Airways

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Control seizures if actively seizing
  - MIDAZOLam
- Consider sedation if patient is combative and unable to provide appropriate airway management
  - KetAMINE
- Intubate if necessary
  - → PR18: Anesthesia Induction
  - Caution: do not allow peri- or post-intubation hypotension or hypoxia; if unable to maintain blood pressure or oxygen saturation, consider placement of supraglottic airway as a temporizing measure
- Ventilate as necessary to maintain $SpO_2 \geq 94\%$
- Monitor $EtCO_2$; attempt to maintain $EtCO_2$ between 35-40 mmHg; do not hyperventilate

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Anesthesia:
  - Phase 1
    - Secure airway if required; use an appropriate induction strategy and intubation procedure based on patient and environment specificity
    - Call ETP prior to paralytic treatment; post-call consultation permitted for RSI in emergency situations
  - Phase 2
    - Deep sedation is required; target RASS -5 without complete or burst suppression
    - Propofol is the preferred agent for phase 2 anesthesia
    - Use narcotic analgesia as required
    - Use EEG-guided anesthesia if appropriate
    - Maintain neuromuscular blockade as required
      - Caution not to mask seizure activity
    - Call ETP prior to paralytic treatment (post-call consultation permitted for RSI in emergency situations)
- Manage hemodynamic instability:
  - Target MAP 80-100 mmHg and systolic blood pressure > 100 mmHg
  - Crystalloid and/or vasopressor administration may be required
  - Consider short-term phenyLEPHRine administration
  - For long-term support, consider NORepinephrine
  - Hypertension associated with traumatic brain injury should generally not be treated in the out-of-hospital setting with anti-hypertensive drugs; if severe hypertension occurs with a sustained systolic blood pressure > 160 mmHg, contact CliniCall for LABETalol or hydrALAzine
    - Call ETP prior to administration of LABETalol or hydrALAzine
  - If hemoglobin is < 90 g/L, transfuse PRBC if available
- Optimize cerebral venous out-flow:
  - Raise head of bed to 30°
  - Promote venous drainage (e.g., cervical collars, ETT ties loose, trans-pulmonary PEEP of 0 cmH2O, trans-pulmonary plateau pressure < 25 cmH2O)
  - Maintain neck neutrality
  - If no esophageal balloon in place, set PEEP 5-10 cmH2O
  - Decompress stomach if required
- Mechanical ventilation strategies:
  - BVM with PEEP valve: maintain adequate oxygenation while preserving adequate cerebral venous drainage
  - Ensure oxygenation goals are being met (SpO_2 > 97%, PaO_2 100-150 mmHg)
  - Ensure ventilation goals are being met ($EtCO_2$ 35-40 mmHg, $PaCO_2$ 35-40 mmHg)

- Minimize Pplats while maintaining ventilation goals
- Control seizure activity:
  - Consider etiology and patient presentation when selecting appropriate agent:
    - MIDAZOLam
    - Propofol
    - Ketamine
    - Phenobarbital
  - Consider the side effect of hypotension: vasopressors may be required to maintain hemodynamic goals
  - Consider the utility of phenyTOIN or phenobarbital for seizing and seizure prophylaxis; treat based on the etiology, patient presentation, and conveyance context (prophylaxis indicated for penetrating head injuries, depressed skull fractures, or a seizing patient)
- Monitor for signs of raised ICP:
  - ONSD of > 6 mm after patient optimization
    - If > 6 mm treat with osmotic therapy
      - If Na < 150 mEq/L: hypertonic saline or mannitol/HTS 100 mL every 5-10 minutes with continuous monitoring of ICP
      - If Na > 150 mEq/L: Mannitol 0.5 g/kg with continuous monitoring of ICP
      - Watch for diuretic effects; be prepared to replace volume loss at 1:1 ratio
      - Call ETP prior to use of hypertonic saline
- Monitor for signs of cerebral herniation:
  - EVD monitoring if in situ, or maintain intracranial pressure monitoring
  - Neurological exam findings:
    - Unilateral pupillary dilation considered to be related to a rise in intracranial pressure
    - Decorticate or decerebrate posturing
    - Seizure activity
  - With signs of herniation:
    - Osmotic therapy: hypertonic saline 3-5 mL/kg bolus or mannitol 1 g/kg
      - Call ETP prior to use of hypertonic saline
    - Short trial of hyperventilation to $PaCO_2$ 25-30 mmHg
    - Contact receiving hospital with updated patient status
  - Consider nimodipine for SAH vasospasm reduction.
- Other monitoring parameters:
  - Maintain normothermia: 36-37.5°C
    - Use fluid warmer for hypothermic patients
    - Institute passive cooling measures and antipyretics for hyperthermic patients
  - Maintain Na+ between 140-150 mEq/L
  - Maintain capillary blood glucose between 6-10 mmol/L
- Arterial or venous blood gas analysis:
  - Adjust mechanical ventilation to ensure adequate oxygenation, appropriate ventilation, and safe ground ventilating parameters
- Consider anti-emetic administration:
  - DimenhyDRINATE
  - Metoclopramide
  - Ondansetron
- Other considerations:
  - Avoid steroid use

Evidence Based Practice

Traumatic Brain Injury

Supportive

- RSI (CCT)
- Plasma infusion
- Rate control

Neutral

- Colloid Infusion
- Fluid Resuscitation
- Hypertonic Saline
- Intubation (CCT)
- Mannitol
- Aggressive Crystalloids
- Blood transfusion
- TBI Score

Against

- Hyperventilation
- Intubation
- Rapid Sequence Induction
- Restricted Crystalloids

References

1. Alberta Health Services. AHS Medical Control Protocols: Adult Head Injury. 2020. [Link]
2. Carney N, et al. Guidelines for the Management of Severe Traumatic Brain Injury, Fourth Edition. 2017. [Link]

Practice Updates

- 2022-09-22: Typographical correction ("hypotension" used where "hypertension" required).
- 2022-04-14: Raised SBP/MAP target to increase patient safety margins.

H04: Eye Injuries

Rob Evans

Updated: May 26, 2021
Reviewed: March 01, 2021

Introduction

Eye trauma can result from wide-ranging causes such as direct eye injury or chemical exposure. These can be life-altering events for patients. Any patient with an eyesight-threatening injury should be conveyed promptly for specialist assessment. Treatment for eye injuries is centred around recognition of the mechanism of injury, the provision of supportive care, and rapid conveyance.

Patients may present with minor symptoms yet still be experiencing injuries with potential long-term consequences.

Out-of-hospital care is centred on recognizing the mechanism of injury, providing supportive care, and rapidly conveying in the case of eyesight threatening trauma. Patients with minor symptoms may still be experiencing injuries with long-term consequences that may not be apparent during out-of-hospital assessment.

Essentials

- In cases of direct eye trauma, cover both eyes and keep the patient at rest.
- Remove contact lenses if present and not adhering to the cornea.
- If condition permits, elevate the patient's head during conveyance.
- Avoid placing pressure on the eye globe while packaging and transferring the patient.
- In cases of chemical exposure, begin irrigation with normal saline while attempting to identify the substance. Bring relevant documentation (e.g., MSDS sheet) with the patient to hospital. Contact CliniCall (1-833-829-4099) for support in managing chemical exposures.
- Provide analgesia and antiemetics as required.

Additional Treatment Information

- Maintain a high index of suspicion for other injuries in the case of direct trauma, including head and spinal injury as well as facial fractures.
- Vomiting increases intraocular pressure; early administration of antiemetics is beneficial.
- Penetrating objects should be left in place and should be stabilized as appropriate.
- If condition allows, assess visual acuity in each eye.
- Do not delay treatment or conveyance to assess visual acuity.

Referral Information

All patients with ocular trauma should be conveyed for specialist assessment.

General Information

- If available, an injured eye should be covered with a rigid shield.
- Patients with eye injuries associated with other facial fractures may have specific considerations for air conveyance if they are being transferred. Associated sinus fractures may result in complications such as pneumocephalus and may present complications when changes in atmospheric pressure occur. Contact CliniCall (1-833-829-4099) for guidance if the patient is undergoing air conveyance as part of care.

Interventions

First Responder

- Keep patient at rest
- Identify source of ocular injury (and chemical substance if appropriate)

- Initiate irrigation with normal saline for chemical injury or other injuries associated with contamination of the eye
  - → PR05: Patient Decontamination

Emergency Medical Responder – All FR interventions, plus:

- CliniCall consultation required for support in managing chemical exposures
- Cover both eyes with a rigid shield if available and clinically indicated
- Convey patient with head elevated if condition allows
- Administer analgesia:
  - → E08: Pain Management
  - Nitrous oxide

Primary Care Paramedic – All FR and EMR interventions, plus:

- Treat or prevent nausea and vomiting
  - DimenhyDRINATE
- Provide analgesia
  - Ibuprofen
  - Acetaminophen

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Provide analgesia
  - FentaNYL
  - KetAMINE

Evidence Based Practice

Ocular Trauma

Supportive

Neutral

Against

References

1. Alberta Health Services. AHS Medical Control Protocols: Adult Eye Injury Management. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]

H05: Spinal Cord and Neck Trauma

Ryan Ackerman

Updated: November 14, 2023
Reviewed: March 01, 2021

Introduction

Spinal cord injuries (SCI), while relatively rare, contribute significantly to morbidity and disability among those affected. Spinal motion restriction (SMR) must be undertaken on any patient who is at risk for SCI. Traditional SMR devices, such as cervical collars and rigid immobilization boards, carry risks of their own and should not be applied without a clinical indication to do so.

Contemporary care for potential SCI patients does not need to be an "all or nothing" approach, but instead should be patient centric. At all times the risks of applying SMR should be weighed against its benefits for each individual patient.

Cervical spine injuries are often the sole source of focus; attention must be paid to thoracic and lumbar injuries as well.

Essentials

- The mechanism of injury alone is not an accurate predictor of spinal column/cord injury.
- The NEXUS C-Spine clearance tool may be used for adult patients.
- NEXUS only applies to cervical spine injuries. Thoracolumbar injuries must be assessed separately.
- Factors such as intoxication, altered levels of consciousness, language barriers, and major distracting injuries can all confound the assessment of spinal injuries.
- Only multi-trauma patients or those with new onset neurological impairment require conveyance on a clamshell stretcher.
- Full SMR refers to a cervical collar, foam rolls (without taping of the head), and a clamshell throughout transport regardless of transport time

Additional Treatment Information

- Known risks associated with SMR include: airway compromise; respiratory restriction; pressure ulcers; decreased cardiac output; vomiting/aspiration; increased intracranial pressure; pain; increased scene time; and more complicated ER management.
- Elderly patients (age ≥ 65) are at greater risk for spinal fractures from lower force injuries. Careful attention must be paid to thorough assessment with any trauma above the clavicles.
- Penetrating trauma requires rapid conveyance. SMR has been shown to increase mortality in these patients.
- Early and frequent focused neurological assessments (motor, sensation) may help monitor an evolving injury.
- Spinal cord injuries often require higher perfusion pressures to overcome swelling. Target a systolic BP > 120 mm/hg in patients with clear signs of neurological deficit.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.
- All patients with spinal cord and neck trauma should be conveyed to the closest appropriate trauma receiving hospital as per local trauma destination guidelines or clinical pathway.

General Information

- NEXUS Criteria:

1. Does the patient have midline tenderness of the cervical spine?
2. Is the patient's level of consciousness altered? (Must be alert and oriented to time, person, place, and event.)
3. Are there new focal neurological deficits?
4. Is the patient intoxicated? (Judgement and pain sensation must be intact.)
5. Is there a major distracting injury significant enough to interfere with their ability to assess pain response when palpating spine?

- If the answer to all five NEXUS questions is "no," SMR is not warranted.
- Thoracolumbar injuries: If the patient does not require SMR based on the NEXUS criteria but has any of the following findings, do

not sit the patient up or raise the head of the stretcher on the assumption that thoracic or lumbar injuries may be present:
- Fall from height > 3m
- Axial loading to head or base of spine
- High speed MVC > 100 km/h
- Rollover MVC
- New back deformity, bruising, or bony midline tenderness

Interventions

First Responder

- Apply spinal motion restriction as clinically indicated
- Supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Initiate conveyance; consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Treat nausea/vomiting:
  - DimenhyDRINATE
- Correct hypo-perfusion/hypotension:
  - → D03: Vascular Access and Fluid Administration
  - For suspected or confirmed spinal cord injury, target systolic BP of > 120 mmHg

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Secure airway if required
  - → PR18: Anesthesia Induction

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Grading using ASIA scoring.
- Manage hemodynamic instability:
  - MAP > 80-85 mmHg for isolated spinal cord injury
  - Consider balanced fluid administration.
  - Vasopressor administration may be required
    - Call ETP prior to vasopressor
    - Phenylephrine
    - Dopamine
    - Norepinephrine
    - Epinephrine
- Respiratory support
  - Signs of impending respiratory failure
    - increasing rate
    - decreasing forced vital capacity
    - rising PCO_2
    - falling PO_2 (late)
  - If mechanical ventilation is required, refer to mechanical ventilation procedure guideline
  - Arterial or venous blood gas analysis
    - Adjust mechanical ventilation to ensure adequate oxygenation, appropriate ventilation, and safe ground ventilating parameters

Evidence Based Practice

Spinal Injury

Supportive

- In-line stabilization for intubation
- C-Spine Clearance
- Scoop stretcher
- Self Extrication
- Leave Helmet in Place

Neutral

- Steroid
- Spinal Precautions
- Short Extrication Devices (ex: KED)

Against

- Long Spinal Immobilization Devices
- Cervical Collar
- Immobilization in Penetrating Trauma

References

1. Abram S, et al. Routine spinal immobilization in trauma patients: What are the advantages and disadvantages? 2010. [Link]
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17. Sundstrøm T, et al. Prehospital Use of Cervical Collars in Trauma Patients: A Critical Review. 2014. [Link]
18. Totten VY, et al. Respiratory effects of spinal immobilization. 1999. [Link]
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H06: Chest Trauma

Rob Evans

Updated: November 28, 2023
Reviewed: March 01, 2021

Introduction

Management of chest injuries represents a challenge in out-of-hospital care. Common chest trauma injuries seen by paramedics and EMRs/FRs include rib fractures, flail chest, simple pneumothorax, hemothorax, open pneumothorax and tension pneumothorax. Paramedics and EMRs/FRs must maintain a high index of suspicion for underlying life-threatening injuries as many patients may present with initially stable vital signs.

Essentials

- Closely monitor all patients with chest trauma for signs of deterioration, with particular attention to respiratory status. Be prepared to support oxygenation and ventilation as necessary.
- Be suspicious of the potential for underlying torso injuries in cases of high mechanisms. Injuries to the great vessels, diaphragm, abdominal organs, and the myocardium can occur.
- Differentiate between blunt and penetrating mechanisms of injury.
- For open chest wounds, utilize a commercial vented chest seal (preferred) or leave open. If bleeding control necessary, gauze may be used.

Additional Treatment Information

- Sealing of open chest wounds may place patients at risk for a tension pneumothorax.
- Monitor these patients closely and relieve pressure by lifting the chest seal or occlusive dressing if a tension pneumothorax may be developing.
- Entonox is contraindicated in patients with a suspected pneumothorax or inhalation injury.
- Decompression of a suspected tension pneumothorax should be rapidly performed in patients with deteriorating respiratory and hemodynamic status (ACP/CCP).
- Positive pressure ventilation may worsen clinical status in patients with an untreated tension pneumothorax.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.
- All patients with chest trauma should be conveyed to the closest appropriate trauma receiving hospital as per local trauma destination guidelines or clinical pathway.

General Information

- Palpation of the chest wall, axilla and neck can be helpful in feeling for the presence of subcutaneous emphysema.
- CPAP is contraindicated in patients with a suspected pneumothorax.

Interventions

First Responder

- Position patient sitting if other injuries permit
- Perform basic airway interventions and be prepared to provide ventilatory support as needed
  - → B01: Airway Management
- Administer high flow oxygen
  - → A07: Oxygen Administration
- Cover open chest wounds with three-sided occlusive dressing

Emergency Medical Responder – All FR interventions, plus:

- Initiate conveyance; consider intercept with additional resources
- Apply chest seal to open chest wounds

Primary Care Paramedic – All FR and EMR interventions, plus:

- Insert supraglottic airway as indicated to support oxygenation and ventilation
  - → PR08: Supraglottic Airways
- Consider vascular access
  - → D03: Vascular Access
- Tranexamic acid if indicated

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Perform needle decompression in signs of decompensating obstructive shock secondary to a suspected tension pneumothorax
  - → PR21: Needle Thoracentesis
- Consider advanced airway management as necessary to support oxygenation and ventilation in deteriorating patients
  - → PR18: Anesthesia Induction
- Manage cardiac dysrhythmias associated with myocardial injury as indicated
  - → C02: Bradycardia
  - → C03: Narrow Complex Tachycardia
  - → C04: Wide Complex Tachycardia
- Administer analgesia as necessary
  - → E08: Pain Management

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Perform ultrasound assessment for pneumothorax
  - Consider Turkel insertion
- Consider rapid sequence intubation for patients requiring oxygenation and ventilator support
- Secure and manage chest drainage system in the interfacility transfer environment as necessary

Evidence Based Practice

Chest Trauma

Supportive

- Chest Tube (CCT)
- Ultrasound
- Needle Decompression

Neutral

Against

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
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H07: Abdominal Trauma

Ryan Ackerman

Updated: July 15, 2023
Reviewed: March 01, 2021

Introduction

Abdominal trauma is one of the major causes of preventable death. Whether blunt or penetrating, the possibility of intra-abdominal injury must be recognized and treated in a timely fashion.

All types of abdominal trauma carry the risk of significant hemorrhage and infection. Blunt abdominal trauma carries a mortality rate of up to 30% and can prove challenging to assess in the out-of-hospital environment. Penetrating trauma is easier to identify, is more often a true surgical emergency, and has a lower mortality rate than blunt trauma.

For both blunt and penetrating abdominal injury, the mainstays of treatment are virtually the same: rapid recognition and rapid conveyance, gentle patient handling, minimal crystalloid fluids to maintain vital organ perfusion, and early administration of tranexamic acid.

Essentials

- Abdominal distension is often a late sign and is indicative of severe intra-abdominal bleeding.
- Penetrating trauma from the nipple line to the umbilicus may result in both chest and abdominal injuries.
- Early TXA administration for suspected intra-abdominal bleeding is associated with decreased mortality rates.
- Aggressive fluid resuscitation in abdominal trauma is associated with higher mortality rates. Titrate fluid administration to achieve normal mentation, peripheral pulses, or a systolic blood pressure of 80-90 mmHg.

Additional Treatment Information

- Retroperitoneal hemorrhage, often from damage to the kidneys or their supplying vasculature, may be difficult to detect and can produce life-threatening blood loss.
- Eviscerated contents should be covered with moist, sterile dressings with an occlusive layer above.
- Blunt trauma to the abdomen is frequently associated with concurrent pelvic injury.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.
- All patients with abdominal trauma should be conveyed to the closest appropriate trauma receiving hospital as per local trauma destination guidelines or clinical pathway.

General Information

- The most common causes of intra-abdominal injuries are motor vehicle collisions followed by stabbing and gunshot wounds.
- Paramedics and EMRs/FRs should pay particular attention to visual clues on inspection prior to palpating. The 'seat belt sign' is a large bruise or abrasion across the lower abdomen and is associated with significant hemorrhage in 25% of patients. Periumbilical bruising, or Cullen’s sign, is a late sign indicative of a retroperitoneal hemorrhage. A 'scaphoid' or sunken appearance to the abdomen may indicate diaphragmatic rupture.
- On physical exam, tenderness or rigidity is often a sign of blood or digestive contents in the abdomen resulting in irritation to the peritoneum. Fractures to the lower ribs may suggest splenic or hepatic injuries. Splenic injury often presents with referred pain to the left posterior shoulder while hepatic injuries refer pain to the right posterior shoulder.
- Auscultation of the abdomen in the out-of-hospital trauma setting rarely yields pertinent information.
- Administration of excessive crystalloid fluids has been shown to increase mortality due to hemorrhage and to increase the risk of secondary abdominal compartment syndrome. When intra-abdominal hemorrhage is suspected or likely based on mechanism of injury or physical exam, crystalloid fluids should only be given when absolutely necessary to restore perfusion to vital organs.
- The application of abdominal junctional tourniquets has been shown to reduce mortality in patients with large vessel hemorrhage of the abdomen and pelvis. In some studies, the benefits of junctional tourniquet application were similar to those achieved

through resuscitative endovascular balloon occlusion of the aorta.

- Out-of-hospital use of 'Focused Assessment with Sonography in Trauma' (FAST) has demonstrated a benefit in the early detection of abdominal trauma in both blunt and penetrating injuries. However, while a positive FAST is highly specific for intra-abdominal bleeding, a negative FAST by itself should not be used to rule out injury or hemorrhage.

Interventions

First Responder

- Control external hemorrhage
- Limit patient movement to reduce clot disruption
- Protect against heat loss: foil blanket against the skin; cover with blankets for insulation; consider chemical heating blanket
- Cover extruded bowel or eviscerated abdominal contents with moist, sterile dressings followed by an occlusive layer
- Consider application of T-POD pelvic binder if evidence suggests concurrent pelvic injury
  - → PR02: Pelvic Binders
- Correct hypoxemia from diaphragmatic or concurrent thoracic injury
  - → A07: Oxygen Administration
  - → B01: Airway Management

Emergency Medical Responder – All FR interventions, plus:

- Initiate conveyance; consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypoperfusion
  - → D03: Vascular Access
- Consider tranexamic acid

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Correct hypoxemia from diaphragmatic or concurrent thoracic injury
- Needle thoracentesis as needed for suspected tension pneumothorax
  - → PR21: Needle Thoracentesis

Evidence Based Practice

Abdominal Trauma

Supportive

Neutral

- Direct Pressure

Against

Pelvic Trauma

Supportive

- Circumfrential Sheet
- Corsette Style Compression Device (e.g. T-Pod)
- External Mechanical Compression Device

Neutral

- MAST

Against

References

1. Balogh Z et al. Secondary abdominal compartment syndrome is an elusive early complication of traumatic shock resuscitation. 2002. [Link]
2. Cole E et al. Tranexamic acid use in severely injured civilian patients and the effects on outcomes: A prospective cohort study. 2015. [Link]
3. Do WS et al. Minimally invasive preperitoneal balloon tamponade and abdominal aortic junctional tourniquet versus open packing for pelvic fracture-associated hemorrhage: Not all extrinsic compression is equal. 2019. [Link]
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14. Wherrett LJ et al. Hypotension after blunt abdominal trauma: The role of emergent abdominal sonography in surgical triage. 1996. [Link]
15. Williams-Johnson JA et al. Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2) A randomised, placebo-controlled trial. 2010. [Link]

H08: Pelvic Trauma

Rob Evans

Updated: June 02, 2021
Reviewed: March 01, 2021

Introduction

Pelvic trauma represents a serious injury and can be associated with high mortality, being the third most common cause of death in blunt trauma after head and chest injuries. The pelvis is formed by the articulation of the ilium, ischium, pubic bones, and sacrum. The pelvis can be fractured by several different mechanisms. Pelvic fractures are often associated with other major traumatic injuries; careful examination and urgent conveyance are key principles of management in these patients.

Paramedic and EMR/FR management of pelvic trauma includes: early recognition; early application of a pelvic binder; rapid conveyance; and treatment of other associated traumatic injuries.

Essentials

- Pelvic binding is not indicated for an isolated neck of femur (NOF) fracture (aka: hip fracture).
- Paramedics and EMRs/FRs should be highly suspicious of pelvic fractures in all patients who have sustained trauma from a high-energy mechanism.
- Apply a pelvic binder early – pelvic splinting should be considered a hemorrhage control intervention.
- Handle the patient gently. Avoid log rolling if possible and convey using a clamshell.
- Examine the abdomen and pelvis gently. Do not rock pelvis to check stability.

Additional Treatment Information

- Pelvic binders are most beneficial in anterior-posterior pelvic fractures (e.g., open book fractures).
- Tranexamic acid should be considered in all patients with suspected pelvic fractures.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.
- All patients with pelvic trauma should be conveyed to the closest appropriate trauma receiving hospital as per local trauma destination guidelines or clinical pathway.

General Information

- The pelvis is typically fractured through one of three primary mechanisms:
  - Anterior-posterior fractures, or open book fractures, occur when force is applied anteriorly to the iliac crests, as might happen in a motorcycle accident where the patient strikes the handlebars
  - Lateral compression fractures occur when force is applied to the sides of the pelvis; side-impact motor vehicle collisions, or pedestrians struck by vehicles, can cause these kinds of forces
  - Vertical shear fractures occur when a patient falls from height and force is transmitted to the pelvis from the lower extremities
- All mechanisms of pelvic fractures can be associated with injury to major blood vessels, viscera, and nerves.

Interventions

First Responder

- Keep the patient warm and prevent further heat loss
- Supplemental oxygen as required
  - → A07: Oxygen Administration
- Maintain a high index of suspicion for pelvic trauma in patients who have sustained a high mechanism of injury
  - → H01: Principles of Major Trauma

- Bind pelvis if indicated using a commercial or improvised pelvic binder
  - → PR02: Pelvic Binders

Emergency Medical Responder – All FR interventions, plus:

- Convey urgently in accordance with provincial triage and clinical pathway guidelines
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access
  - → D03: Vascular Access
- Consider antifibrinolytics
  - Tranexamic acid

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider administration of blood products if available

Evidence Based Practice

Pelvic Trauma

Supportive

- Circumfrential Sheet
- Corsette Style Compression Device (e.g. T-Pod)
- External Mechanical Compression Device

Neutral

- MAST

Against

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
3. Campbell JE et al. International trauma life support for emergency care providers. 8th ed. 2016.

H09: Extremity Trauma

Neal Carman

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Introduction

Extremity trauma is a common, potentially life-threatening phenomenon. Injuries to the limbs include fractures and bleeding, which should be immobilized and controlled, respectively. Paramedics and EMRs/FRs should endeavour to resolve neurological or vascular compromise wherever possible.

Essentials

- Bleeding from limbs can be life threatening. Control using direct pressure. Apply tourniquets as necessary.
- If a limb is pulseless and severely angulated, it should be repositioned to allow for the restoration of pulses.
- Fractures require stabilization with good splinting practices.

Additional Treatment Information

- Altered sensation, loss of a pulse, or cold and dusky skin in a limb distal to a fracture or dislocation is an indicator of neurological or vascular compromise. This is a limb threatening injury and is time critical.
- The general principles of reducing a fracture are:
  - Provide procedural analgesia (→ E08: Pain Management)
  - Irrigate open wounds with 500 mL to 1 L of saline
  - Apply traction and gentle counter-traction in the line of the limb
  - If required, further manipulation should be done while the limb is still under traction
  - Splint the limb following reduction
- Amputated limb portions should be rinsed with cool sterile saline prior to being wrapped in loose, saline-moistened sterile gauze. The limb can then be placed inside a plastic bag and kept in a cool, protected place while being conveyed with the patient. Do not immerse the amputated limb in water, keep the limb cool, and do not place directly on ice or use dry ice to cool.
- The use of traction splints should be reserved for isolated, closed, mid-third femoral fractures. In major trauma cases, or with multiple injuries, splint the injured leg to the opposite leg (anatomical splinting) and use a clamshell to immobilize.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.
- All patients with extremity trauma should be conveyed to the closest appropriate trauma receiving hospital as per local trauma destination guidelines or clinical pathway.

General Information

- Fractures are a condition in which there is a break in the continuity of a bone. It may be caused by direct force or indirect impact. The aging process causes significant changes to the skeletal system; bones become less flexible, more brittle, and more susceptible to fractures. Additionally, pathological conditions such as tumours of the bone, periosteum, cartilage, or other diseases, can also increase the likelihood of fractures.
- Fractures are characterized by deformity, swelling, pain, bruising, crepitus, and instability.
- Fractures are categorized as:
  - Closed; surrounding skin remains intact ☐
  - Open; disruption in the surrounding skin with or without protruding bone ends
- Dislocations are a separation of two bones where they meet at a joint. In a complete displacement of a bone end from its normal joint position, the bone sits in an abnormal position. Risks associated with dislocations include trapping, compressing, or tearing of blood vessels and nerves. Dislocations are usually characterized by obvious deformity, pain, swelling, and immobility of the joint.
  - Paramedics and EMRs/FRs should exercise a high degree of suspicion with possible knee dislocations (as distinct from patellar dislocations): assume that a significant underlying arterial injury exists requiring careful management.

- Isolated knee or ankle/foot injuries may be evaluated using the Ottawa Knee Rule and the Ottawa Ankle Rule.
  - Ottawa Ankle Rule (for ankle and/or foot trauma):
    - Bone tenderness at the posterior edge, or tip, of either the lateral or medial malleolus, or
    - An inability to bear weight for four steps (both immediately after injury and in the emergency department), or
    - Bone tenderness at the base of the fifth metatarsal, or
    - Bone tenderness at the navicular.
    - Note: palpate the entire 6 cm distal of the fibula and tibia; "bearing weight" counts even if the patient limps; be cautious in patients under age 18.
  - Ottawa Knee Rule: imaging required if:
    - Patient age ≥ 55, or
    - Isolated tenderness of the patella and no bone tenderness of knee other than the patella, or
    - Tenderness of the head of the fibula, or
    - The patient is unable to flex the knee to 90 degrees, or
    - The patient is unable to bear weight for four steps (both immediately after injury and in the emergency department), or
    - The patient is unable to transfer weight twice onto each lower limb, regardless of whether they are limping.

Interventions

First Responder

- Control life threatening bleeding
- Direct pressure to sites of obvious ongoing blood loss
- Rapid application of tourniquet for catastrophic extremity injury or significant bleeding uncontrollable through direct pressure
  - → PR03: Tourniquets
- Consider wound packing to control ongoing bleeding
  - → PR04: Wound Packing
- Stabilize obvious fractures

Emergency Medical Responder – All FR interventions, plus:

- Consider traction splint for isolated mid-third femoral fracture for prolonged conveyance

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access and fluid replacement
  - → D03: Vascular Access
- Consider tranexamic acid
- Provide analgesia as required
  - → E08: Pain Management

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider procedural sedation for re-positioning fractures
  - → PR17: Procedural Sedation

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider blood products for significant hemorrhage

Evidence Based Practice

Extremity Trauma

Supportive

- Antibiotic (open fracture)

Neutral

- Procedural Sedation

Against

Limb Amputation/Mangled/Major Hemorrhage

Supportive

- Hemostatic dressing
- Pre-alert (massive transfusion protocol)
- Tourniquet (limb)

Neutral

- Direct Pressure
- Tourniquet (junctional)

Against

References

1. International Trauma Life Support. Utilization of traction splints with open femur fractures. 2011. [Link]
2. The Ottawa Rules. [Link]

H10: Burns

Tom Zajac

Updated: October 20, 2022
Reviewed: March 01, 2021

Introduction

Burns are the result of damage to cellular membranes, producing widespread injury to the integumentary system. This damage can cause severe fluid loss, place patients at heightened risk for infections, and lead to hypothermia. Soft tissue burns can be caused by thermal injuries, chemical exposure, electrical contact, or exposure to ionizing radiation. The mainstay of treatment for burns involves cooling, fluid resuscitation, and pain management. Burns are optimally managed at an appropriate trauma receiving hospital.

Essentials

- It is critically important to maintain the airway. Burned patients should receive supplemental oxygen; paramedics and EMRs/FRs must be keenly aware of the potential for rapid development of airway compromise, either from upper airway obstruction or pulmonary edema. Signs of airway burns include cough, voice changes, and soot in the mouth, nose, or in sputum. Consider early advanced airway management in these cases.
- Patients must be decontaminated where applicable. Remove clothes and flush burns with cool running water or saline. Hair, hands, and face should be cleaned with water and baby shampoo.
- It is recommended that patients with burns receive 15-20 minutes of cooling in the immediate aftermath of the burn. This is inclusive of any time bystanders have provided effective cooling measures. Cooling of burns immediately following injury is a critical intervention to reduce the risk of skin graft requirements, long-term scarring, chronic pain, and sensory disturbances. Cooling is also an important analgesic strategy in these patients. Burns should be cooled with cool (not cold) running water wherever possible, which may involve remaining on scene for over 20 minutes in patients without immediate life-threatening burns or injury, to access a source of cool running water. In patients requiring immediate conveyance, the use of cool saline may be sufficient to help limit the damage caused by the burn. Paramedics and EMRs/FRs should continue to be diligent in monitoring for signs of hypothermia whilst cooling burns patients and avoid whole-body cooling if possible. Consider utilizing ambulance heater if required.
- If applying burns dressings, the 'shiny side' faces down/towards the patient.
- Burned patients lose fluids rapidly. In the immediate aftermath of a burn, patients should receive up to 2 liters of fluid to maintain a systolic blood pressure > 120 mmHg.
- For partial thickness or deeper burns, estimate the body surface area involved using the Lund and Browder chart.

Additional Treatment Information

- Burns are often associated with other types of trauma. Fluid therapy to manage shock due to blood loss must strike a balance between the patient’s fluid requirements resulting from the burn and the need to prohibit further bleeding from the traumatic injury.
- In any fire environment, carbon monoxide is a by-product of combustion and is one of the many chemical products in smoke. Carbon monoxide poisoning should be suspected in any patient who was in an enclosed space. Provide high-flow supplemental oxygen and monitor SpCO where available. See J02: Carbon Monoxide for additional treatment information.
- Hydrogen cyanide is a colourless gas with a faint, bitter, almond-like odor. Sodium cyanide and potassium cyanide are both white solids with similar odours in damp air. Cyanide salts and hydrogen cyanide are used in electroplating, metallurgy, the production of organic chemicals, photography, plastics manufacturing, the fumigation of ships, and some mining processes. Fires involving modern building materials, plastics, and furnishings can also produce large amounts of cyanide, and individuals exposed to the smoke from these fires can have significant cyanide exposures. See J03: Cyanide for additional treatment information.
- Critical Care Paramedics should follow Trauma Services BC's Provincial Burn CPG (available from the Trauma Services BC web site).

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.
- All patients with burn trauma should be conveyed to the closest appropriate trauma receiving hospital as per local trauma destination guidelines or clinical pathway.

General Information

- Trauma Services BC defines a major burn as any of the following:
  - > 20% total body surface area (TBSA) partial and/or full thickness, any age
  - > 10% TBSA partial and/or full thickness, age < 10 or > 50
  - > 5% TBSA full thickness, any age
  - Burns to face, hands, feet, genitalia, or joints
  - Electrical burns
  - Chemical burns
  - Inhalation injury
  - Any burns associated with major trauma
- The American Burn Association classifies burns as minor, moderate, and major based upon burn depth and size. The traditional classification of burn depth as first, second, third, or fourth degree is being replaced by a system reflecting the future treatment requirements in the continuum of care, although 'fourth degree' is still used to describe the most severe burns.
  - Superficial: burns involving only the epidermal layer of the skin; they are painful, dry, red, and blanche with pressure
  - Superficial partial-thickness: burns involving the epidermis and superficial portions of the dermis; they are painful, red and weeping, usually form blisters, and blanch with pressure
  - Deep partial-thickness: burns extending deeper into the dermis damaging hair follicles and glandular tissue; they are painful to pressure only, almost always blister, are wet or waxy dry, and display variable colour from patchy white to red
  - Full thickness: burns extending through, destroying the dermis; they are usually painless and the skin can vary in appearance from waxy white to leathery grey, to charred and black
  - Fourth degree: burns extending through the skin to underlying tissues of the fascia or muscle

Interventions

First Responder

- Maintain awareness of airway patency
  - → B01: Airway Management
- Remove burned clothes and decontaminate patient as required
  - → J01: Approach to Toxic Exposures
  - → PR05: Patient Decontamination
- Cool burned areas for 15-20 minutes using cool running water wherever possible; this may require remaining on-scene for a prolonged period of time
  - In patients with life-threatening injuries where it is not possible to remain on-scene, the use of cool saline may be sufficient to help limit the damage caused by the burn
  - Avoid cooling the entire patient to prevent hypothermia
- Provide supplemental oxygen for patients with potential airway burns or inhalation injuries
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Estimate total surface area using Burn Estimation Charts
- Initiate conveyance; consider intercept with additional resources
- Consider utilization of ambulance heater during conveyance if significant body surface area cooling required
- If no inhalation injury, consider nitrous oxide to effect

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access
  - → D03: Vascular Access
- If hypotensive:
  - Consider other causes of shock
    - → D01: Shock
  - Fluid bolus 500 mL up to maximum of 2 L

- In cases of prolonged conveyance:
  - Ongoing fluid maintenance calculation
    - (Patient weight in kg) x (total burned surface area in %) x 1.5 ml = (volume to be administered over 8 hours)
- Analgesia as required:
  - → E08: Pain Management
  - Intranasal KetAMINE

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Provide analgesia as required:
  - FentaNYL
  - KetAMINE
- Consider induction and anesthesia maintenance strategy if airway management is predicted; ketamine is the preferred induction agent; phenylephrine must be available for peri-intubation hypotension; post-induction analgesia is likely to be required
  - → PR18: Anesthesia Induction
- Consider early surgical airway (FONA) if deterioration predicted
  - → PR22: Surgical Airways

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Hemodynamic support in interfacility transfers
  - Fluid 3ml x kg x %TBSA
    - 50% given in the first 8 hours
    - 50% percent given in the next 16 hours.
  - Change to balanced fluids (Plasmalyte/Ringers Lactate)
    - Goal is urine output 30-50 ml/hr
    - If urine output ≤ 30 ml/hr increase rate by %20.
    - If urine output ≥ 50 ml/hr decrease rate by %20.
    - If urine output < 15 ml/hr for 2 consecutive hours or requiring 2 x the fluid rate for 2 consecutive hours consider Albumin 5% at 1/3 fluid rate while the remainder 2/3 will be Ringers or Plasmalyte.
    - Call ETP prior to treatment of Albumin
  - At 12 hours post-injury calculate the 24 hour fluid
    - If 24 fluid rate exceeds 6ml x kg x %TBSA then initiate Albumin 5% at 1/3 fluid rate while the remainder 2/3 will be Ringers. Titrate the fluid to urine output.
    - Assess for abdominal compartment syndrome with a bladder pressure.
  - NORepinephrine to maintain MAP > 65 mmHg
  - Hemoglobin ≥ 70 g/L
    - Call ETP prior to treatment of blood administration
      - → PR30: Out-of-Hospital Blood Administration
  - Consider calcium or cortisol for catecholamine resistant shock or adrenal insufficiency.
    - Call ETP prior to treatment of calcium or adrenal insufficiency
- Respiratory support
  - Neuromuscular blockade as required for induction and to facilitate mechanical ventilation; rocuronium is the preferred agent
  - Warning: succinylcholine is contraindicated in burns > 24 hours old
  - Follow restrictive lung disease ventilation strategies.
  - Consider escharotomy for inability to ventilate secondary to circumferential or near-circumferential burn.
  - Call ETP prior to escharotomy treatment
- Pain control
  - HYDROmorphone
- Suspect cyanide toxicity and provide hydroxycobalamin if two of the following are present:
  - SBP < 90 mmHg
  - Lactate > 9 mmol/L
  - Decreased level of consciousness
  - Measured cyanide > 39

- Apply Trauma BC Provincial Burn Guidelines for interfacility conveyances in consultation with transport advisor

Evidence Based Practice

Possible Airway Burns

Supportive

- Mechanical Ventilation (CCT)

Neutral

Against

Electrocution/Electrical Burns

Supportive

- Narcotic

Neutral

- 12-Lead ECG
- Cardiac Monitor

Against

Chemical Splash/Burn

Supportive

- Narcotic
- Irrigation Skin

Neutral

Against

Burns (fire/flame)

Supportive

- Narcotic
- Nitrous Oxide

Neutral

- Crystalloid Fluid
- Wet/hydrogel dressing

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]

2. Alberta Health Services. AHS Medical Control Protocols: Algorithm #5 - Burns. 2020. [Link]
3. BC Emergency Medicine Network. Major Burns Trauma. [Link]
4. Vancouver General Hospital. Burn CPGs. [Link]

H11: Electrical Injuries

Ryan Ackerman

Updated: May 25, 2021
Reviewed: March 01, 2021

Introduction

Electrical injuries are typically categorized as either low voltage (< 1,000 volts), high voltage (> 1,000 volts), or lightning injuries. High voltage injuries typically involve subcutaneous fat, muscle, and bones. Current flow, arcs, or flames from the ignition of nearby material may cause injuries. Voltage, amperage, type of current (AC versus DC), path of current flow, and duration of contact all play a role in the severity of the injuries.

Low voltage injuries present with similar patterns but typically have a lesser degree of injury.

Lightning strikes can conduct millions of volts of electricity very rapidly yet often result in lesser physical injury than high voltage contact. Lightning frequently results in cardiorespiratory arrest for which prompt CPR/defibrillation is often successful.

Essentials

Paramedic and EMR/FR safety is critical: do not approach electrical sources or downed power lines until qualified personnel have deemed the scene safe.

- Reverse triage victims of a lightning strike: patients in cardiac or respiratory arrest should be treated first.
- Cardiac arrest is the most immediate threat in both high and low voltage electrical injuries. Follow standard cardiac arrest guidelines.
- Secondary trauma from falls after electrical shock is common.
- Continuous cardiac monitoring is indicated if available.

Additional Treatment Information

- External burn size is a poor indicator of the extent of internal injuries.
- Fluid resuscitation needs are often higher for electrical injuries than for thermal burns.
- High voltage electrical injury patients are at risk for developing rhabdomyolysis which may lead to hyperkalemia. Early fluid resuscitation can limit the associated renal damage.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations

General Information

- Lightning produces incredibly high voltage and amperage over a very short duration of contact with the patient. In a lightning strike, current tends to flow around the outside of the body, and as a result, internal electrical injuries are rare. The most common injuries sustained in a lightning strike are 'flashover burns', which happen when the direct current heats the skin and vaporizes any moisture on the patient's skin. These burns are typically superficial and rarely require fluid resuscitation.
- Lightning does not need to directly strike the patient to cause injuries. It is common for entire groups of people standing near a lightning strike to be injured. In cases of triaging multiple patients, initial efforts should be focused on those in cardiac or respiratory arrest. Spontaneously breathing patients following a lightning strike have a high likelihood of survival without further intervention. Those in cardiac or respiratory arrest are likely to have good outcomes with prompt resuscitation.
- The extent of injury caused by electrocution is dependent on the following factors:
  1. The type and amount of current (AC vs DC, voltage, and amperage)
  2. The route the current follows through the body
  3. The duration of contact with the energy source
- The most immediate life threat is a cardiac dysrhythmia, usually ventricular tachycardia or ventricular fibrillation. Cardiac arrest following electrocution is generally a result of electrical disruption rather than damage or burns to the myocardium itself. Early, aggressive resuscitation efforts are often successful in restoring cardiac output as these patients are general younger and healthier.

- Electrical arcing can generate temperatures in excess of 2,500° C. External burns are most often seen at the site of entry and exit and rarely provide an accurate representation of internal injury. Even small entry/exit wounds can be associated with significant internal tissue damage.
- The internal effects of high voltage electrocution can be grave. Muscle tissue, connective tissue, bones, blood vessels, nerves, and organs in the path are all at risk for serious thermal injury. Muscle damage can lead to rhabdomyolysis as muscle cells rupture, spilling myoglobin and potassium into the systemic circulation. Bones may be directly damaged or even fractured by violent sustained muscle contractions. Intravascular coagulation may occur as the current passes through major vessels. This occasionally results in secondary thrombotic events.
- Fluid resuscitation needs in electrical injuries are often higher than for isolated thermal injuries. Fluid volume calculations based on body surface area (BSA) burned are not accurate for electrical burns. An initial normal saline bolus of 5ml/kg followed by 100ml/hour is appropriate for normotensive patients in the out-of-hospital setting. Extended care and inter-facility goals should titrate fluid to achieve a urine output of 0.5-1ml/kg/hour.

Interventions

First Responder

- Ensure scene safe from live electrical power
- Consider spinal motion restriction
- If in cardiac arrest: begin compressions and follow appropriate guidelines for resuscitation
  - → N02: Adult Cardiac Arrest
  - → M06: Pediatric Cardiac Arrest
- Supplemental oxygen as required
  - → A07: Oxygen Administration
- Flush and decontaminate affected area with sterile saline
  - → PR05: Patient Decontamination
- Do not cool burns longer than 1-2 minutes, including decontamination time
- Dress injuries as required
- Identify type of current and duration of contact

Emergency Medical Responder – All FR interventions, plus:

- Initiate rapid conveyance and consider intercept with additional resources
- Consider analgesia
  - → E08: Pain Management
  - Nitrous oxide

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access
  - → D03: Vascular Access
- Fluid resuscitation: for high voltage injuries (> 1000 Volts), initial bolus of 5 ml/kg followed by 100 ml/hour

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider analgesia:
  - KetAMINE
  - FentaNYL
- Treat known or suspected hyperkalemia
  - → E03: Hyperkalemia

Evidence Based Practice

Electrocution/Electrical Burns

Supportive

- Narcotic

Neutral

- 12-Lead ECG
- Cardiac Monitor

Against

Lightning

Supportive

- Prolonged Resuscitation

Neutral

Against

References

1. Gentges J et al. Electrical injuries in the emergency department: An evidence-based review. 2018. [Link]
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H12: Drowning

Rob Evans

Updated: May 26, 2021
Reviewed: March 01, 2021

Introduction

Drowning is a complicated clinical scenario for paramedics and EMRs/FRs. It may involve mild symptoms to situations requiring prolonged resuscitation. Complications of submersion incidents can include atelectasis, pulmonary edema, infection, hypothermia, and trauma. In British Columbia, there are over 50 drowning fatalities every year and an additional 40 near drowning cases requiring hospitalization. At least 20% of survivors experience permanent brain injury as a result of hypoxia, making early and appropriate out-of-hospital management important in promoting favourable outcomes.

Essentials

- **Caution:** Ensure paramedic and EMR/FR safety at all times around water. Wear lifejackets in accordance with High Risk Hazards policies and procedures.
- Cervical spine injury is uncommon in submersion incidents, but paramedics and EMRs/FRs should be alert to the possibility of damage based upon the mechanism of injury.
- All patients, including those with apparently minor injuries or symptoms, should be conveyed for observation due to the risk of developing secondary hypoxemia over subsequent hours.
- The early use of CPAP and/or PEEP can be beneficial for patients with hypoxemia and respiratory distress.
- Paramedics and EMRs/FRs must ensure adequate oxygenation, and prevent both heat loss and aspiration.

Additional Treatment Information

- Hypothermia should be managed in accordance with → I01: Hypothermia.
- Be suspicious for traumatic injuries based on the history of events leading up to submersion. Apply spinal motion restriction as appropriate.
- Manage cardiac arrest in accordance with resuscitation CPGs, with particular focus on oxygenation and airway management.
- Consider medical causes of cardiac arrest in patients where the mechanism of submersion does not appear to match the clinical presentation or severity of symptoms.
- There is no difference in the management of patients submerged in fresh water versus salt water.
- ***Cardiac arrest considerations:***
  - Although survival is uncommon in victims who have undergone prolonged submersion requiring protracted resuscitation, successful resuscitation (with full neurological recovery) has occasionally occurred after prolonged *immersion* in icy water (and in some instances warm water). For this reason, scene resuscitation should be initiated and patients conveyed to the emergency department unless there are obvious signs of death.
  - Patients who have been *submerged* in water for a prolonged time should be evaluated for applicability of the rapid discontinuation criteria.

Referral Information

- CliniCall should be involved for guidance in managing prolonged or special resuscitation situations (e.g., hypothermic submersion). See EMR interventions below.
- Contact CliniCall for assistance in managing patients refusing conveyance with minor symptoms and who are at risk for developing lung injury. See EMR interventions below.

General Information

- Water in the lungs results in alveolar collapse (atelectasis) which leads to a ventilation perfusion mismatch and impaired gas exchange. Lung injury may take up to six hours to develop following a submersion incident.
- Monitor patients for non-specific symptoms such as productive cough, tachypnea, or mild crackles on auscultation. These can be warning signs of deterioration.
- It is important to differentiate 'immersion' from 'submersion': a submersion involves the whole body, including the airway, being

submerged in water. Immersion does not necessarily imply submersion.

- Hypothermia can be present in both situations and it can be difficult to differentiate whether cardiac arrest is due to primary immersion (e.g., hypothermia) or submersion (hypoxemia).
- Swimming Induced Pulmonary Edema (SIPE) is a phenomenon seen in individuals undertaking strenuous surface swimming in cold water (e.g., triathletes or rescue personnel). Symptoms include dyspnea, hypoxemia and possible hemoptysis with a presentation similar to cardiogenic pulmonary edema. Treatment consists of oxygen administration, CPAP, and advanced airway management/mechanical ventilation as needed to correct hypoxemia.

Interventions

First Responder

- Apply spinal motion restriction as indicated based on the mechanism of injury
- Keep the patient at rest
- Position the patient sitting up
- Remove wet clothing and dry the patient
- If the patient is in cardiac or respiratory arrest, immediately commence resuscitation according to the appropriate guideline
  - → N02: Adult Cardiac Arrest
  - → M06: Pediatric Cardiac Arrest
- Supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- CliniCall consultation required in the setting of hypothermic cardiac arrest
  - Contact CliniCall early for guidance and treat in accordance with the hypothermic cardiac arrest guideline
- Obtain vital signs and treat hypothermia according to the hypothermia guideline
  - → I01: Hypothermia
- Administer supplemental oxygen as indicated
  - → A07: Oxygen Administration
- Perform basic airway management and initiate intermittent positive pressure ventilations (IPPV) if required to support failing respirations
  - → B01: Airway Management
- Treat associated traumatic injuries according to the relevant practice guideline
- CliniCall consultation required for assistance in managing patients refusing conveyance with minor symptoms and who are at risk for developing lung injury

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider Continuous Positive Airway Pressure (CPAP) for management of hypoxemia secondary to pulmonary edema/atelectasis
  - → PR09: Continuous Positive Airway Pressure
- Consider placement of a supraglottic airway for ongoing resuscitation according to the resuscitation guideline
  - → PR08: Supraglottic Airways
- If providing IPPV, consider application of a PEEP valve to assist with alveolar recruitment and oxygenation
  - → PR10: Positive End Expiratory Pressure

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider advanced airway management to support ventilation/oxygenation/management of contaminated airway
  - → PR18: Anesthesia Induction
- If the patient is unconscious, consider placement of a gastric tube to decompress the stomach and facilitate airway management
  - → PR14: Orogastric Tube Placement

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider mechanical ventilation to optimize oxygenation and ventilation

- Conduct point of care testing as indicated to guide mechanical ventilation strategy
- Consider invasive temperature monitoring in the setting of hypothermia

Evidence Based Practice

Drowning

Supportive

- NiPPV

Neutral

- Prolonged Resuscitation

Against

References

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H13: Soft Tissue Trauma

Rob Evans

Updated: May 25, 2021
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Introduction

Paramedics and EMRs/FRs may be called upon to care for patients with a variety of soft tissue injuries related to both minor and major trauma. The term encompasses a broad range of conditions such as contusions, sprains, strains, tendinitis, and bursitis. The most commonly injured soft tissues include muscles, tendons, and ligaments; complex injuries may involve multiple structures. Common causes include falls, sports injuries, motor vehicle collisions, or assaults.

Essentials

- Paramedics and EMRs/FRs should differentiate between acute and chronic injuries. The latter are likely due to overuse or may indicate a chronic pain syndrome. Acute pain is generally < 6 weeks duration. Careful history taking is recommended.
- In acute injuries, maintain a high index of suspicion for an associated fracture or dislocation.
- If a fracture or dislocation is suspected, apply appropriate splinting and convey promptly.
- Assess for neurovascular impairment and convey promptly if present.
- In the case of a head, back, or neck injury, apply spinal motion restriction guidelines as indicated.

Additional Treatment Information

- Primary treatment consists of rest, ice, compression, and elevation.
- If open wounds are associated with the injury, irrigate with sterile saline before applying appropriate sterile dressings.
- Consider paramedic or EMR scope appropriate analgesia as indicated.

General Information

- Conduct ongoing monitoring of neurovascular function and observe for signs of compartment syndrome.
  - The anterior compartment of the lower leg is the most common site for development of compartment syndrome
  - The 6 P's of compartment syndrome are a late sign (pain, pallor, pulselessness, paresthesia, paralysis, and poikilothermia)
- Avoid applying ice packs directly to the skin.
- If the injury involves an ankle, assess using the Ottawa Ankle Rules.
- Patients with minor injuries may meet criteria for a local waiting room pathway upon arrival at destination.

Interventions

First Responder

- Provide/maintain position of comfort
- Assess affected area closely and monitor for signs of neurovascular impairment
- Provide spinal motion restriction if indicated
  - → H05: Spinal Cord Injuries
- Irrigate any associated wounds with sterile saline and dress with appropriate sterile dressings
- If an associated fracture or dislocation is suspected, provide appropriate splinting
- Apply RICE (Rest/Ice/Compression/Elevation) if applicable to anatomical site of injury

Emergency Medical Responder – All FR interventions, plus:

- Consider analgesia
  - → E08: Pain Management

Evidence Based Practice

Minor Trauma

Supportive

- Ice

Neutral

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
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H14: Dental Trauma

Andrew Guy

Updated: June 02, 2021
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Introduction

Dental trauma is common and often overlooked in the context of more concerning head or neck injuries. While the majority of dental injuries are not time sensitive and can be dealt with on an outpatient basis, some dental injuries can significantly benefit from prompt and appropriate treatment.

Essentials

- A dental avulsion (where the tooth is completely dislodged from the socket) is a true emergency. The chance of tooth survival increases from 85-97% if reimplanted at 5 minutes, and down to 0% after one hour without appropriate steps to preserve or reimplant the tooth.
- The best way to preserve an avulsed tooth is to reimplant it as soon as possible. Patients can do this if they are comfortable with the procedure and there are no airway concerns.
- If a tooth is not reimplanted due to airway concerns, excessive pain, or patient unwillingness, all avulsed teeth (and fragments of fractured teeth) should be preserved and taken with the patient to the emergency department or dentist.
- Avulsed or fractured teeth should be placed in a sealed container or bag and immersed in cool milk if available. The patient's saliva can also be used by having the patient spit into a container. The saliva of a family member or friend may also be used for this purpose.
    - Paramedics and EMRs must ensure that appropriate precautions are taken when asking patients to spit into containers or bags, and that appropriate personal protective equipment is used. Do not collect saliva from an individual who may have an active respiratory tract infection.
    - Save-a-Tooth kits solution (Hank's balanced salt solution) can also be used if the patient has this at home. If none of these products are available, saline solution is acceptable. Plain water should be avoided wherever possible, but is preferable to allowing the tooth to dry out.
- If there are no airway concerns, the patient may also preserve the tooth by keeping it in their mouth, coated in saliva.

Additional Treatment Information

Should a patient decide to reimplant a tooth themselves:

- Avoid handling the tooth by the root.
- Gently clean any dirt or debris with normal saline prior to reimplantation. Do not scrub the tooth.
- Push the tooth into the socket until a click or resistance is felt.
- Hold the tooth in place manually, or bite down on a piece of gauze en route to hospital.

General Information

Simple dental anatomy is useful to understand dental injuries. The tooth consists of the crown and the root. The crown is the portion that sits above the gumline and is visible normally. The root is the portion which anchors the tooth into the socket in the mandible and is not visible. The root is attached by strong periodontal ligaments to the bone. These ligaments are critical to the health of the tooth and important to avoid damage through handling.

The general types of dental injuries are useful to know in order to determine appropriate treatment:

- Dental fracture: The tooth is broken or cracked.
- Dental subluxation: The tooth is loose or has been moved but the root still remains in the socket.
- Dental avulsion: The root of the tooth is completely displaced from the socket.

Note: Pediatric dental avulsions of "baby teeth" are not an emergency and should not be reimplanted. However, it is extremely difficult for non-specialists to distinguish between permanent and baby teeth. Assume all teeth are permanent until seen by an expert. Paramedics should not attempt to reimplant teeth in patients younger than 16 years of age; in these cases, preserve the tooth, and transport to hospital.

Interventions

First Responder

- Manage the airway as required and address concurrent injuries or clinical problems
- Ensure gentle handling of all avulsed teeth or dental fragments; do not handle by the root.
- Preserve avulsed teeth or dental fragments by immersing them in:
  - Cool milk
  - The patient's own saliva (or the saliva of a friend or family member)
  - Saline
- Do not touch loose or damaged teeth that are still in the socket

Emergency Medical Responder – All FR interventions, plus:

- Ensure teeth stay with the patient on arrival at the emergency department and that triage is aware the patient has a dental injury

Primary Care Paramedic – All FR and EMR interventions, plus:

- Provide analgesia as required for injuries.
  - → E08: Pain Management
- Consider reimplantation of tooth in socket:
  - Avoid handling the tooth by the root.
  - Gently clean any dirt or debris with normal saline prior to reimplantation. Do not scrub the tooth.
  - Push the tooth into the socket until a click or resistance is felt.
  - Hold the tooth in place manually, or bite down on a piece of gauze en route to hospital.

Evidence Based Practice

Tooth Avulsion

Supportive

- Hank's Solution
- Replantation
- Saline
- Saliva

Neutral

- Milk
- Water

Against

References

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I01: Hypothermia

John Merrett

Updated: June 02, 2021
Reviewed: March 01, 2021

Introduction

Hypothermia is defined as a drop in body core temperature below 35°C. Peripheral thermometers are of limited utility in hypothermia – they can be inaccurate and vary by as much as 2°C – but their readings can provide paramedics and EMRs with valuable data in respect to trends. Because core temperature probes (either rectal or esophageal) are generally unavailable in a out-of-hospital setting, recognition of the different stages of hypothermia is more important than an understanding of the exact boundaries.

General hypothermia management consists of removing the patient from the cold environment, ensuring the patient is dry, and to prevent further heat loss. Paramedics and EMRs/FRs should handle patients gently and attempt to keep them supine whenever possible.

Essentials

Although patient presentations can vary widely, the signs and symptoms of hypothermia can be divided into three categories:

- Mild hypothermia is defined as a core temperature between 32°C and 35°C. These patients have a normal mental status with shivering, tachypnea, tachycardia, initial hyperventiliation, ataxia, jumbled speech, impaired judgment, and "cold diuresis."
- Moderate hypothermia features a core temperature between 28°C and 32°C. Patients present with an altered mental status and are no longer shivering. Lower heart rates, and an attendant reduction in cardiac output are common. Atrial fibrillation, junctional bradycardias, or other dysrhythmias can develop. Respiratory rates decrease and hyporeflexia can occur as a result of central nervous system depression. The altered mental status may cause patients to remove clothing.
- Severe hypothermia features a core temperature between 24°C and 28°C. Unconsciousness, hypotension, and bradycardia are common. Pulmonary edema can develop, as can ventricular dysrhythmias or asystole.

Additional Treatment Information

WARNING: HYPOTHERMIA IS A SIGNIFICANT CONTRIBUTOR TO MORTALITY IN TRAUMA

In general, patients should be treated in a step-wise manner, beginning with less aggressive rewarming techniques. "Passive rewarming," through the use of blankets around the body and the head, coupled with "active rewarming" using heated IV solutions, offers an effective initial strategy for most patients who are perfusing effectively.

While environmental exposure may trigger an assessment for hypothermia, paramedics and EMRs/FRs are cautioned that other groups of patients may be at risk for developing hypothermia in atypical environments. Clinical problems that produce an altered level of consciousness can eventually result in hypothermia, including (but not limited to) behavioural or psychiatric problems, prolonged seizures, alcohol or drug intoxication, strokes and cerebrovascular accidents, and diabetic or other metabolic emergencies. Elderly or frail individuals who are "found down" in their homes are at significant risk for developing hypothermia. Paramedics and EMRs/FRs must perform comprehensive assessments, and treat identified conditions concurrently with the hypothermia.

Depending on the degree of thermogenesis from shivering, the rewarming rate for patients may be anywhere from 0.5°C to 2°C per hour. The addition of active rewarming measures, using insulated or wrapped heat packs applied to the torso (groin, sides of chest, back of neck, small of back, and axillae) will significantly improve comfort and may lessen thermal stress.

Do not attempt to rewarm frozen or frostbitten limbs.

Hypotension can result from decreased cardiac output. Fluid shifts into the extracellular space are common, producing dehydration. Vascular access is indicated in hypothermia with warmed saline (between 37°C and 42°C) as the fluid of choice, if available. In the out-of-hospital environment, it can be difficult to warm or measure the temperature of fluids; paramedics are cautioned that "room temperature" fluids will significantly worsen hypothermia.

General Information

Hypothermic patients have significantly reduced metabolic demands and have dramatic reductions in heart and respiratory rates. A range of 30 to 45 seconds should be taken to accurately assess spontaneous respiration and pulse rates. Afterdrop, a phenomenon where cold blood from the extremities returns to the core, can occur producing an additional drop in core temperature.

Electrocardiogram findings in hypothermia can include J or Osborn waves (positive deflections following the QRS complex), most prominently in V_2 through V_5. The height of the wave is roughly proportional to the degree of hypothermia, though these are non-specific and may be due to other clinical phenomena.

Interventions

First Responder

- At all times: handle patients gently
- Remove from cold environment, remove wet clothes, and prevent further heat loss
- Initiate passive rewarming with blankets
- Assess for concurrent injuries or conditions and treat as required
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient's location
- Communicate patient deterioration to follow-on responders
- In cardiac arrest:
  - Begin and maintain chest compressions.
  - Attach AED and analyze as indicated
  - Defibrillate up to 3 times as indicated; after 3 defibrillation deliveries, do not pause compressions to analyze rhythm or attempt additional defibrillations

Emergency Medical Responder – All FR interventions, plus:

- Obtain baseline vital signs, including temperature where possible
- Consider active rewarming measures (e.g., wrapped hot packs) for moderate hypothermia
- In cardiac arrest:
  - Begin and maintain chest compressions
  - Consider conveyance to a hospital capable of extracorporeal blood rewarming if within 90 minutes; these facilities are available in Vancouver, Victoria, and Kelowna
  - CliniCall consultation recommended if clinical pathway options are unclear and to discuss care planning options

Primary Care Paramedic – All FR and EMR interventions, plus:

- Establish vascular access
  - → D03: Vascular Access and Fluid Administration
  - If available, consider warmed saline (37°C-42°C) for hypotension (30 ml/kg, maximum 2 L)
- Obtain capillary blood glucose and treat as required
  - → E01: Hypoglycemia and Hyperglycemia

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain and interpret 12-lead electrocardiogram
  - → PR16: 12-Lead ECG
- Consider transcutaneous pacing for persistent bradycardia if core temperature is between 32°C and 35°C
  - → PR19: Transcutaneous Pacing
- In cardiac arrest:
  - May administer up to 3 doses of EPINEPHrine

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Vasopressors may be necessary to support blood pressure
- Rhabdomyolysis and multi-organ system failure can develop during rewarming process
- Consider Buddy warmer
- Consider conveyance to centre capable of extracorporeal blood rewarming (ECMO) in cases of severe hypothermia refractory to treatment
  - Review BC Accidental Hypothermia Treatment Guideline

Evidence Based Practice

Hypothermia

Supportive

- AER (Active External Rewarming)

Neutral

- Temperature Monitoring
- Warmed IV Fluids

Against

- Inhalation Rewarming

I02: Hyperthermia

Sara Kendall

Updated: May 12, 2023
Reviewed: May 12, 2023

Introduction

Hyperthermia is a life-threatening emergency that requires immediate and aggressive treatment to lower body temperature. Untreated, heat stroke leads to multiorgan failure and death, and the single greatest contributor to patient morbidity and mortality is the duration of the elevated core body temperature.

First responders, emergency medical responders, and paramedics can expect an increase in frequency and intensity of extreme heat events as climate destruction worsens these phenomena.

This guideline provides clinicians with the knowledge necessary to quickly recognize environmental heat injury, identify environmental and population-based risk factors, and to perform critical rapid cooling techniques.

Essentials

- Rapid recognition of environmental factors and patient risk factors for heat illness is key to management. Be aware of the diversity of the clinical manifestations of heat illness.
- Cooling should be initiated on scene wherever possible, and continued throughout patient transport.
- Recognize and treat concurrent dehydration if present.

Warning:

Hyperthermia as a result of increased environmental temperature is not equivalent to hyperthermia produced because of fever or medication use. Use clinical observation to differentiate the primary cause of heat, and treat environmental heat exhaustion/heat stroke according to this protocol.

- **DO NOT treat environmental heat exhaustion/heat stroke with anti-pyretics.** There is no role for antipyretic agents such as acetaminophen or aspirin in the management of heat stroke, since the underlying mechanism does not involve a change in the hypothalamic set-point and these medications may worsen complications such as hepatic injury or disseminated intravascular coagulation (DIC).
- **IV Fluid should not be routinely administered** to patients suffering from heat stress unless signs of dehydration, hypotension, or shock are present, in which case it should be started after initiating full-body cooling and given with caution with the goal of correcting hypoperfusion. Ensure that saline solution is NOT WARM to the touch.
- **Oral hydration is not an effective cooling technique**. Dehydration can be a concomitant pathology that demands attention, as mentioned above. Patients who are dehydrated and able to ingest liquids should self-administer oral rehydration solution (electrolytes) if available without delaying transport.

Additional Treatment Information

- Induced hypothermia is an unwarranted concern for paramedic care of heat-injured patients.
- Consultation with CliniCall may help to guide care planning in call cases of hyperthermia. Pre-arrival notification to receiving facilities can improve transition of care and initiation of core temperature monitoring and management.
- The basic treatments for heat emergencies are the same across all license levels and vary only in the case of critically ill patients suspected of heat stroke.
- The management of classic heat stroke consists of ensuring adequate airway protection, breathing, circulation, **rapid active cooling**, and treatment of complications.
- In-hospital treatment consists of full-body ice-water immersion in a dedicated tank or in body bags with core temperature monitoring and management of end-organ complications. Full-body cooling is continued until core temperature drops to 38.3–39°C; manifestations of organ damage are managed specifically and separately (e.g. coma, adult respiratory distress syndrome, disseminated intravascular coagulation, hepatic failure, renal failure, rhabdomyolysis).
- Be sure to differentiate shaking and tremors from seizures. Manage seizures in accordance with F02: Seizures.

Referral Information

ASTaR for heat emergencies - includes alternative destination and access to cooling centres and advice for home

General Information

Heat stroke has a remarkably high mortality rate, between 21-63% in heat stroke patients who arrive to hospital. The first cells affected by core body temperature ≥ 40º C are: neurons, hepatocytes (liver cells) and vascular endothelial cells (the inner lining of all blood vessels), yet all body organs will be injured by hyperthermia.

It can be hard to fully recognize the threat of heat stroke because the damage is at a cellular/tissue level. It is therefore critical that the paramedics identify abnormalities in any body system during their initial and ongoing assessments, and record and report their findings during patient handover in hospital.

The importance of initiating cooling on-scene cannot be overstated. All heat illness patients should receive immediate cooling on-scene and during transport, regardless of proximity of higher level of care or predicted time of conveyance.

Environmental risk factors for development of heat illness include:

- Hot weather, with or without high environmental humidity
- Enclosed spaces with poor ventilation
- Outdoor spaces with no shade
- Lack of access to water

Patient-specific risk factors for the development of heat illness include:

- Elderly individuals: the body has a lower water content in older age, which predisposes elders to severe heat injury compared to younger people
- Mental illness, specifically schizophrenia, can predispose individuals to severe heat injury.

Caution: These two groups are considered the highest-risk cohorts for the development of lethal heat injuries. Exercise extreme care while developing patient care plans, consult with CliniCall as required, and convey patients to appropriate destinations if safety cannot be assured.

- Obesity: adipose tissue insulates the body and retains heat; it may also generate additional heat
- Physical exertion
- Concomitant or chronic illnesses
- Use of alcohol, drugs, or other medications (including anticholinergics, antidopaminergics, antihistamines, antipsychotics, beta- and calcium channel blockers, diuretics, antidepressants, and lithium).
- Pregnancy
- Socioeconomic and/or Occupational vulnerability

Signs and Symptoms of Heat illness and Injury:

The formal definition of heat stroke – either exertional or classic heat illness from high environmental temperatures, with or without physical activity – is a core temperature above 40°C with central nervous system dysfunction. Measurement of core temperature is only authorized for CCP providers, meaning that other providers must use clinical findings as part of their assessment. History is critically important. Use observations of the environment as well as patient signs and symptoms to guide treatment planning.

Differentiating between heat exhaustion and heat stroke can be difficult. The key element is the degree of central nervous system impairment. The treatment for both is the same.

Heat exhaustion and heat stroke can mimic or present concurrently with many other illnesses. Paramedics must consider the possibility of sepsis, ischemic strokes, hypoglycemia, toxic ingestion, or drug misuse.

Prevention is critical and can save lives. Patients with stable vital signs, fully intact level of consciousness and orientation and no signs of heat exhaustion or heat stroke can be moved to a cool environment and encouraged to rest and stay hydrated. When providing on-scene guidance and support to patients, remember that fans alone are insufficient for cooling purposes, and may exacerbate heat exposure due to convective air movement in areas where ambient temperatures exceed 35°C.

"Heat cramps" are localized and painful muscle spasms most often due to electrolyte loss from strenuous activity in a hot environment, cramp onset is usually at rest immediately after activity. Heat cramp patients have no evidence of dehydration. Paramedics, emergency medical responders, and first responders can encourage heat cramp patients to self-administer oral electrolyte drinks.

Heat stroke or heat exhaustion should be assumed in any patient exposed to extreme environmental heat with any of the following signs and symptoms:

- Extreme weakness
- Flushed, hot skin; pale, cold skin; with or without sweating
- Shivering
- Pallor
- “Prickly heat” sensation
- Dehydration
- Fatigue
- Headache
- Light-headedness
- Altered mental status
- Confusion
- Behavioural changes
- Imbalance (ataxia)
- Unresponsive
- Seizure
- Tachycardia
- Hypotension
- Dysrhythmia
- Tachypnea or bradypnea
- Low SpO2
- Abdominal cramps, nausea, vomiting, or diarrhea
- Persistent muscle cramps

Interventions

First Responder

- Recognize early signs of heat injury and treat accordingly:
- Heat cramps: rest in a cool place and recommend oral electrolytes

Open any ventilation sources if indoors / move patient to shade if outdoors.

If any signs/symptoms of heat exhaustion or heat stroke are present, begin immediate cooling:

- Remove all clothing on patient
- To maximal extent possible, based on patient presentation (primarily level of consciousness, patient capacity to follow instructions, absence of other priority intervention needs) and available resources, begin cooling with coldest water possible. The goal is to promote rapid, continuous heat loss. Options may include:
  - If available, begin convective cooling with air conditioning set to maximum cold in conjunction with any other interventions
  - Application of cold, wet towels to head, torso, and thighs to promote evaporative cooling
  - Full-body immersion in bath tub with cold water and ice
  - High-flow cold water in shower while seated in chair
  - Immersion of feet and legs in a bucket or basin of ice water
  - **Caution!** Do not attempt immersion or shower-based cooling in patients who are not able to ambulate safely. Apply principles of safe patient movement as described in PR01: Ambulating Patients prior to selecting a cooling strategy.
- Assess patient continually during cooling.
- Notify follow-on responders of clinical findings and request response time updates

Emergency Medical Responder – All FR interventions, plus:

- Continue cooling efforts for a minimum of 10 minutes prior to beginning conveyance to hospital.
- Assess and record vital signs every 10 minutes. Initial vital signs must include blood glucose measurement.
- The most aggressive cooling method available should be applied during transport and continued until the recommended treatment endpoints are reached.

- Continue evaporative cooling with soaked towels (head, torso and thighs).
- Begin or continue convective cooling with AC of ambulance on maximum cold.

Primary Care Paramedic – All FR and EMR interventions, plus:

After immediate rapid cooling is underway:

- Consider need for fluid replacement in patients with signs and symptoms of dehydration. **Do not administer intravenous fluids that are warm to the touch.**
  - → D03: Vascular Access and Fluid Administration
  - CliniCall Consultation recommended to discuss fluid resuscitation and care planning options.
- Record history: exposure time, details of environment, all symptoms patient is able to communicate. Ask about headache, visual disturbances, palpitations, shortness of breath, nausea, vomiting, urine output.
- Continual serial assessments of neurological status, blood pressure and pulse
- Assess capillary blood glucose; correct hypoglycemia as required
  - → E01: Diabetic Emergencies
- For obtunded, unresponsive patients, consider supraglottic airway
  - → PR08: Supraglottic Airways

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain and interpret 12 lead ECG when possible.
  - Manage dysrhythmias as required. Note that dysrhythmias associated with heatstroke do not usually resolve until patient is normothermic. VF/VT can be defibrillated, but cooling remains the definitive treatment
- Consider anticonvulsant
  - → F02: Seizures
- Consider endotracheal intubation in unresponsive patients
  - → PR18: Anesthesia Induction

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider rectal or esophageal core temperature read within 2 minutes of patient contact and ongoing throughout cooling.
- Stop cooling when body temperature reaches 38-39°C
- Monitor for and correct metabolic derangements (hypernatremia, hyperkalemia, acidosis)

Evidence Based Practice

Hyperthermia

Supportive

- External Cooling

Neutral

- IV Fluid as a cooling agent
- Temperature Monitoring

Against

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Practice Updates

- 2022-09-22: Typographical corrections.
- 2022-06-04: Revised and re-published. The previous version archived, no longer publicly available.
- 2022-07-29 - Addition of Heat Emergency ASTaR Pathway in the referral section.

I03: Diving & Scuba Injuries

John Merrett and Mike Sugimoto

Updated: May 25, 2021
Reviewed: March 01, 2021

Introduction

Although scuba divers can experience a myriad of injuries from wildlife and trauma, the two most serious forms of diving injuries are decompression sickness (DCS) and arterial gas embolism (AGE), both of which are directly related to the behaviour of pressurized gases. In many cases, the signs and symptoms of decompression sickness and gas emboli overlap significantly; it is not important to differentiate between the two in the out-of-hospital environment with treatment for both being essentially identical.

Decompression Sickness ("The Bends")

Scuba divers breathe compressed air. At depth, the nitrogen in this air dissolves into the bloodstream and diffuses into body tissues at variable rates. The water pressure around the diver keeps this gas dissolved in the blood and tissues, but as a diver ascends, water pressure decreases, allowing the dissolved gases to withdraw. (This is similar to opening a pop can – the carbon dioxide remains in the liquid because of the pressure inside the can – and the behavior of gases under pressure is described by Henry's Law.) Normally, during an ascent, divers change depths slowly and breathe constantly ensuring that the nitrogen is released from their lungs. Under some circumstances – a rapid ascent from too deep a dive, for instance – the dissolved gas may not diffuse into the lungs and may instead accumulate in the blood, musculoskeletal system, or other body tissues, as bubbles.

Type 1 DCS is limited to the capillaries of the skin, lymphatic vessels, and the musculoskeletal system. It generally includes skin rashes or urticarial and joint pain. In its milder form, the symptoms can be fleeting and last only a few minutes as the bubbles break down and the diver off-gases; these do not generally require treatment. Pain at or around joints is rarely symmetrical. In more severe cases, the pain can increase over 12 to 24 hours after surfacing, and if untreated, will resolve slowly over the next three to seven days to a dull ache.

Type 2 DCS is more serious. It involves the central nervous, cardiovascular, and respiratory systems; common symptoms include headache, blurred vision, nausea, dizziness, and ataxia. Shortness of breath, hypotension, and weakness can occur. In many cases, Type 1 symptoms are also present.

Arterial Gas Embolism

The pressurized gas breathed by a diver at depth expands as they ascend, following the relationship described by Boyle's Law. If the expansion is not accommodated or controlled, the expansion can be fatal. In the lungs, gas can expand and rupture alveoli, introducing air into the bloodstream. Once in the blood, the bolus of air is carried into the heart, and then into the arterial circulation. Air can also be forced into the pleural space between the lungs and chest wall; in some cases, this is the result of a congenital weakness. Pleural air expansion can lead to either mediastinal emphysema (a collection of air in the mediastinum) or subcutaneous emphysema in the neck or upper chest.

AGE is the most common cause of death in scuba diving.

Essentials

- DCS should be considered in any diver who, within 24 hours of completing a dive, complains of a persistent headache, dizziness, joint pain, or difficulty balancing. Most DCS cases are mild and treatment is often successful, but recognition can be difficult and expert consultation is required.
- AGE presentations are sudden, catastrophic events that become obvious upon surfacing. A diver who surfaces in distress should be assumed to have an AGE or other barotrauma until proven otherwise.

Additional Treatment Information

- The immediate history of the dive can provide clues to the probability of DCS. Some of the risk factors include:
  - Strenuous work at depth
  - Deep dives on air only (e.g., no mixed gas)
  - Long bottom times
  - Cold water dives
  - Repetitive dives
  - Missed or shortened safety stops

    - Dehydration and/or recent alcohol consumption
- Individual susceptibility to DCS is not well understood and the phenomenon is not predictable. Divers can strictly follow tables and use computers to monitor their dives and still develop DCS. Every dive carries some risk of DCS and the absence of risk factors on any given dive does not preclude the possibility of the disorder. A diver demonstrating symptoms consistent with DCS, and who lacks any of the risk factors listed above, should still be considered a potential diving injury until appropriately assessed.
- Individuals who have experienced DCS are at significant risk of subsequent episodes. A prior history of a patent foramen ovale, or other structural heart disease resulting in a right-to-left intracardiac shunt, is also at high risk of developing DCS.
- Although joint pain within 30 minutes of surfacing is considered a classic symptom of DCS, headaches and flu-like symptoms are also common. Joints commonly involved include the shoulders and elbows with the pain being unchanged on movement. These symptoms may take up to 24 hours to develop. Joint pain often resolves in several days.
- AGE presentations are often associated with rapid, buoyant ascents as might occur when a diver panics; breath holding during an ascent is a common cause. An AGE is an abrupt onset event: divers may be in obvious difficulty on the surface. The development of symptoms beyond 10 minutes post-dive is unlikely to be due to an AGE (consider DCS in this case).
    - Signs and symptoms of AGE include:
        - Collapse and unconsciousness
        - Seizures
        - Visual field disturbances or blindness
        - Weakness or paralysis
        - Disorientation
        - Bloody, frothy sputum
        - Chest pain
        - Shortness of breath
    - Barotrauma can occur when compressed gas becomes trapped within a space in the body such as a dental filling, sinus, or the middle or inner ear. Pain and bleeding are common; dizziness, vertigo, and loss of hearing in the affected ear may be present as well.
    - Carbon monoxide toxicity can develop from breathing contaminated air, either in the scuba tank itself, or in the air on a boat. Treat in accordance with J02: Carbon Monoxide.
    - Every breathing gas mixture has a critical limit, below which the oxygen becomes toxic. For air, that limit is roughly 200 feet; as the concentration of oxygen in the breathing mixture increases, the limit becomes shallower. Oxygen toxicity develops only in the context of increased partial gas pressures (i.e., it does not happen at atmospheric pressure), and can cause dizziness, nausea, facial tics, visual field disturbances, or seizures. These often develop at depth and remain present upon surfacing. Distinguishing between oxygen toxicity and DCS can be difficult, though a history of the dive (depth, breathing gas mixture) will help.
    - Marine life can cause a variety of injuries ranging from punctures and lacerations to venomous stings. Follow standard wound care procedures in managing these types of injuries.
    - In jellyfish stings, flush the affected area using seawater, as fresh water can cause the nematocysts to fire. Do not use vinegar or other fluids for stings occurring in Canadian coastal waters. After flushing, paramedics and EMRs/FRs should attempt to cautiously, and gently, remove any remaining tentacles by scraping with the dull edge of a knife or plastic card.

Referral Information

Signs of DCE can be subtle, and may take time to develop. An emergency physician should always see patients suspected of having suffered a dive injury. Consultation with a specialist in hyperbaric medicine is highly recommended.

General Information

- Deliver oxygen at the highest possible percentage and flow rates to symptomatic patients. Continue providing oxygen even if symptoms appear to resolve. Use a non-rebreather face mask, or bag-valve mask with reservoir. CPAP and PEEP are contraindicated due to the risk of exacerbating an underlying barotrauma.
- To the maximum extent possible, patients should be kept supine. If required to protect the airway, an injured diver may be positioned laterally, left side down.
- Dive injuries can be multifaceted. Hypothermia can complicate management and physical trauma sustained during the dive must be addressed. Do not focus on dive-related injuries to the exclusion of other clinical problems.
- The sole hyperbaric chamber accessible to civilians in the province of British Columbia is at Vancouver General Hospital. Follow clinical pathway guidelines – recompression therapy must be coordinated with the hyperbaric unit at VGH prior to patient arrival at the facility; in the absence of traumatic injuries requiring a trauma centre, patients should be conveyed to their nearest facility

for assessment and referral. If the patient is to be flown to VGH, cabin altitude should be kept below 300 metres (1,000 feet) where possible.

- When communicating with other health care providers, paramedics and EMRs/FRs must be clear about terminology: these patients have experienced a *dive injury* or a *scuba injury*, not a *diving injury*.
- Paramedics and EMRs/FRs should make a concerted effort at gathering information relating to the dive, interviewing the injured diver's buddy, and securing the diver's gear (particularly any computer or monitoring equipment that recorded the depth profile).

Interventions

First Responder

- Position patient supine where possible
- Provide high flow oxygen
  - → A07: Oxygen Administration
  - → B01: Airway Management

Emergency Medical Responder – All FR interventions, plus:

- Obtain thorough dive history
- Consider activation of air conveyance resources

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider conveyance to a decompression chamber
- Consider altitude restrictions for conveyance
  - Does not necessarily require sea level but should not exceed the altitude of the sending hospital or scene

Evidence Based Practice

Diving Injury (Decompression Sickness or Bends)

Supportive

Neutral

- Direct Transport To Hyperbaric Facility
- NSAIDs
- Oxygen

Against

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J01: Approach to Chemical or Toxic Exposures

Robert MacMillan and Mike Sugimoto (ed)

Updated: May 27, 2021
Reviewed: March 01, 2021

Introduction

This clinical practice guideline is intended to provide general advice for paramedics and EMRs/FRs managing toxic or chemical exposures where the substances involved can be classified as irritants, asphyxiants, acids, or alkalis.

Separate practice guidelines exist for specific agents:

- → J02: Carbon Monoxide
- → J03: Cyanide
- → J04: Hydrogen Sulfide
- → J05: Organophosphates and Carbamates

Essentials

- The safety of paramedics and EMRs/FRs is paramount. Every patient's need for decontamination must be carefully evaluated, and measures taken to control or eliminate ongoing contamination hazards. Do not attempt to convey patients who have been insufficiently decontaminated.
  - CliniCall consultation required prior to undertaking decontamination procedures.
- Under no circumstances will BCEHS paramedics or EMRs/FRs provide care in hot or warm zones.
- Avoid contaminating ambulances or downstream health care providers and facilities: ensure that an appropriate decontamination is completed prior to loading a patient for conveyance. Downstream contamination can cause significant systemic disruption and must be avoided.
- Chemical exposures require a collaborative approach between agencies. Paramedics and EMRs/FRs will need to rely on the expertise of other responders at these scenes.
- The vast majority of toxic or chemical exposures can be managed symptomatically. Very few agents have specific out-of-hospital treatments. Supportive basic care (airway control, support for oxygenation and ventilation, and management of hypotension) are often more important than antidote administration.
- Apply a staged approach to all aspects of management, including airway control.

General Information

In all cases of chemical exposure, consultation with CliniCall for decontamination requirements and care planning is required. If there is uncertainty over the need for decontamination, the patient should undergo dry decontamination and then be re-assessed. Collaborate with other providers on scene.

Pulmonary Irritants

These agents primarily affect the respiratory tract and mucosal membranes. They include industrial chemicals like chlorine, ammonia, and phosgene. Mixing of household cleaning products, such as bleach and toilet bowl cleaners, can result in the production of irritant gases. Their effects vary depending upon their solubility in water. Upon contact with the mucosal membranes, they tend to dissociate into associated acids or bases, producing irritation. Bronchospasm is common, and severe exposures can result in non-cardiogenic pulmonary edema.

Asphyxiants

Asphyxiants are primarily gases whose dangerous properties relate to their ability to displace oxygen from a space. As the oxygen concentration falls, mental acuity among affected individuals begin to decrease while coordination and balance also decline. Loss of consciousness occurs at concentrations below 10%, and death can occur quickly where oxygen concentrations are below 6%. Patients who are removed from oxygen-deficient environments can be confused, agitated, combative, or comatose – all related to hypoxia.

Many asphyxiants have no warning properties such as taste, odour, or colour. Some of these gases are flammable or explosive. Examples include hydrogen, helium, ethane, ethylene, nitrogen, neon, carbon dioxide, argon, acetylene, methane, propane, and propylene. Exposure to an asphyxiant does not generally require decontamination; where decontamination is required, dry decontamination and removal of clothing will generally suffice. If patients are swiftly removed from an oxygen-deficient environment, recovery can be rapid; prolonged exposure to hypoxic environments can lead to irreversible end-organ damage.

Acids

Widely used in both household and industrial applications, acids can be found in products as diverse as toilet bowl cleaners, drain cleaners, metal polishes, electroplating solutions, descaling solutions, and battery fluid. Exposure to acids generally involves splashes to the skin or into the eyes resulting in corrosive burns; ingestion of acid solutions or inhalation of acid fumes occurs occasionally.

All patients who have been exposed to acids must be decontaminated. The most effective method is to remove clothing and flush with copious amounts of running water. Acids attack proteins in tissue, causing a coagulation necrosis and inflammation; airway compromise may occur and should be managed conservatively. Bronchospasm should be treated as required.

Alkalis

Like their acid counterparts, alkaline corrosives are found in numerous household and industrial products and processes. Common examples include drain and oven cleaners, detergents, bleaches, and hair care products. “Lye” and “caustic soda” both refer to any strong alkali, generally either sodium hydroxide, potassium hydroxide, or a carbonate compound. Alkaline corrosives disrupt the lipid membranes of tissues, causing significant damage. As with other substances discussed in this guideline, the degree of damage depends heavily on the concentration of the substance, the duration of contact, and the total time of exposure.

These patients must be decontaminated. Brush off powdered material before removing clothes and flushing with water. Skin may feel “soapy” during flushing; continue flushing until the soapiness subsides. In cases of ingestion, and in consultation with CliniCall, consider giving 100-200 mL of milk or water to dilute the substance, but do not give in cases of nausea or vomiting.

Supraglottic airway devices are contraindicated due to potential ingestion of caustic substances.

Interventions

First Responder

Scene control:

- Protect responders and the public; isolate large-scale incidents, such as transportation accidents, according to the initial protective distances in the Emergency Response Guidebook (orange book)
- Stage in a safe environment until the scene is sufficiently controlled
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient’s location
- Communicate patient deterioration to follow-on responders
- Assess and communicate the need for additional resources; identify the number of patients affected
- Ensure appropriate decontamination is performed prior to any patient assessment
    - → PR05: Patient Decontamination
- Apply a staged approach to the management of the airway, oxygenation, and ventilation
    - → B01: Airway Management
- Apply supplemental oxygen as required
    - → A07: Oxygen Administration
- Ventilate using bag-valve mask if respirations are inadequate or absent
- Do not attempt to remove clothing that has frozen to the skin; thaw first with warm water
- Flush skin and mucous membranes exposed to chemical agents with copious amounts of warm water; flushing should be done for at least 15 minutes and may take place concurrently with decontamination
- If eye exposure has taken place, gently remove contact lenses if not adherent to the cornea; flush eyes with water; do not attempt to open eyelids frozen shut by exposure to cryogenic liquids

Emergency Medical Responder – All FR interventions, plus:

CliniCall consultation required to discuss initial steps and plan for care of affected individuals.

General patient management:

- Use appropriate pharyngeal adjuncts (NPA/OPA) where required
  - → PR07: Nasopharyngeal Airways
- Administer high flow oxygen
  - → A07: Oxygen Administration

Primary Care Paramedic – All FR and EMR interventions, plus:

- Continue to apply a staged approach to airway management
  - → PR09: Continuous Positive Airway Pressure
  - → PR10: Positive End Expiratory Pressure
- Do not use supraglottic airway devices in cases of caustic (acid or alkaline) ingestion
- Consider the use of CPAP for patients who meet the appropriate criteria
- Consider the use of PEEP with a bag-valve mask to support oxygenation in patients whose respirations are inadequate
- Consider treating bronchospasm as required
  - → B03: Bronchospasm and Asthma
- Consider pain management
  - → E08: Pain Management
- For ongoing hypotension, consider vascular access and fluid administration to a systolic blood pressure of 90 mmHg
  - → D03: Vascular Access

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Continue to apply a staged approach to airway management
  - Endotracheal intubation is unlikely to be required in most cases; graded application of interventions will support oxygenation and ventilation in the majority of patients

J02: Carbon Monoxide

Robert MacMillan

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Introduction

Carbon monoxide (CO) is a colourless, odourless, tasteless, non-irritating gas produced by the incomplete combustion of carbon-containing material such as gasoline, heating fuels, propane, oil, wood, and coal. Unintentional CO poisoning commonly results from inhalation of smoke from house fires, automobile exhaust, flue gas from furnaces or stoves, exhaust gas produced by outboard motors, ice-resurfacing machines, and barbecues used in poorly ventilated areas. Fatalities have been reported in those swimming near the engine exhaust outlets of boats and where gas-powered stoves and generators are misused as an indoor heat source.

Natural gas and propane do not contain CO, but can produce CO if burned without enough air. Methylene chloride, a common ingredient in paint stripper, can be metabolized to CO in the body after exposure.

Tobacco smokers have chronically elevated carboxyhemoglobin levels (see Toxic Dose).

Essentials

- Paramedics and EMRs must contact CliniCall regarding care planning for any suspected or confirmed CO poisoning.
- Remove patients to ambient air prior to assessment.
- Decontamination is not required for patients exposed to CO only. Patients who are removed from a house fire require a dry decontamination (i.e., removal of clothing) as a minimum measure before being loaded in an ambulance.
- High flow oxygen and supportive care is the treatment for all patients exposed to CO.
- ACP resources should be requested, if available, to measure carboxyhemoglobin (COHb) levels.
- Fire departments can measure CO levels inside buildings and this should be accomplished where possible.
- Standard pulse oximetry can be misleading in patients who have been exposed to CO; these devices are only able to detect oxygenated and deoxygenated hemoglobin and not any other form (such as carboxyhemoglobin or methemoglobin).

Additional Treatment Information

- Clinical effects of CO:
  - An elevated COHb level is diagnostic of exposure but may not reflect severity of poisoning or potential for development of delayed neurological sequelae. A more useful method of assessing the level of exposure *may be* to divide clinical signs into categories of severity. The category should be based on early symptoms.
    - Mild: throbbing temporal headache; dizziness; nausea and vomiting; blurred vision
    - Moderate: impaired thinking; confusion; severe headache; syncope or brief loss of consciousness; tachycardia; chest pain; dyspnea; tachypnea; weakness
    - Severe: myocardial ischemia; dysrhythmias; hypotension; cardiac arrest; respiratory failure; seizures; coma

Referral Information

Patients who have COHb levels between 3-10%, and who are symptomatic, require conveyance to hospital. Asymptomatic patients with COHb levels between 3-10% may not need conveyance, provided:

- The patient is with a responsible adult
- There is no history of ischemic heart disease
- The building is cleared of CO
- The patient is not pregnant
- There is no history of syncope

Exposures > 10% require conveyance.

NB: these criteria depend on the ability to measure COHb, which is only available to ACP/CCP units in British Columbia. Point-of-care CO-oximetry can be unreliable, and in-hospital arterial blood gas sampling can reveal significant discrepancies in the amount of COHb in a patient's blood. Paramedics and EMRs/FRs should, on the whole, be biased in favour of conveying patients with potential CO exposure to hospital for observation and additional evaluation.

General Information

- CO is readily absorbed after inhalation and crosses the placenta. The elimination half-life of CO is 4-5 hours breathing room air, 1-2 hours breathing 100% oxygen, and approximately 20 minutes with hyperbaric oxygen (2.5 atm).
- Hyperbaric oxygen (HBO) is a therapeutic option for treatment of CO poisoning. HBO produces a 10-fold increase in the amount of oxygen dissolved in blood, increases oxygen delivery to hypoxic tissues, and enhances CO elimination. HBO may also inhibit secondary cell damage (lipid peroxidation, mitochondrial dysfunction).
  - Complications of HBO therapy are infrequent. Ear and sinus pain (common) are managed with decongestants and surgical myringotomy in a small number of patients. Confinement anxiety, pulmonary barotrauma, and oxygen toxicity seizures occur rarely.
  - Despite several prospective trials examining HBO in preventing delayed neurologic sequelae, it remains unclear which patients clearly benefit from HBO or which clearly have no potential for benefit. Each patient must be assessed individually, evaluating potential benefits and risks. The following must be considered: current clinical status; time since exposure; acute vs. chronic exposure; risk of conveyance, travel time to HBO chamber; concomitant diseases; and pregnancy status. Decision may be made in consultation with the poison control centre or the hyperbaric unit.
  - Patients who **may likely** benefit from HBO treatment for CO poisoning include those with:
    - Neurologic signs: altered mental status; coma; cerebellar dysfunction; seizures
    - History of loss of consciousness
    - Pregnant patient with COHb level > 20%
  - Patients who may possibly benefit from HBO treatment for CO poisoning include those with:
    - Myocardial ischemia or cardiac dysrhythmias
    - Metabolic acidosis
    - Older patients
    - Asymptomatic patients with COHb levels > 25%
  - CO poisoning can result in permanent neurologic damage and death. CO poisoning is one of the leading causes of death worldwide; however, death is uncommon in patients who reach medical care. The major goal of treatment is prevention of delayed neurologic sequelae in survivors.
  - The mechanism of toxicity is complex and not fully understood. Toxicity is a result of hypoxia, ischemia, and direct cellular damage. CO binds to heme proteins, impairing normal oxygen function. CO-associated nitric oxide release may enhance oxidative and inflammatory injury to the brain. CO also has a direct effect on cellular respiration by inhibiting the activity of cytochrome oxidase and can provoke a metabolic acidosis.
  - Hemoglobin has an affinity for CO that is 200-250 times greater than its affinity for oxygen. COHb is formed, displacing oxygen from hemoglobin and producing a leftward shift in the oxyhemoglobin dissociation curve resulting in decreased oxygen delivery to tissues and causing hypoxia. Myoglobin is affected similarly, with its CO affinity being 60 times greater. Impaired oxygen delivery may cause myocardial ischemia, resulting in dysrhythmias and systemic hypotension.
  - The toxic dose of CO is highly variable. The degree of poisoning is dependent on the concentration of CO in the inspired air, the duration of exposure, the level of activity among those exposed, and underlying patient health. Infants, patients with pre-existing cardiovascular or lung disease, anemia, and in utero fetuses are more susceptible to CO.
  - Normal COHb blood levels in nonsmokers can be up to 2%. Smokers of 2-3 cigarette packages per day may have COHb levels as high as 7-9%.
  - Exposure to 545 ppm for 10 minutes has produced headache; inhalation of 5000 ppm for 5 minutes has been reported to be fatal.
  - Automobile exhaust may contain up to 100,000 ppm (10%) CO.

Interventions

First Responder

- Have patient(s) removed from exposure
- Decontaminate as required if fire was source of CO
  - → PR05: Patient Decontamination
- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- All patients should receive 100% oxygen through a non-rebreather face mask
  - → A07: Oxygen Administration
- Protect airway and assist ventilations as needed

- → B01: Airway Management

Emergency Medical Responder – All FR interventions, plus:

ClinCall consultation required to discuss care planning for all patients suspected of carbon monoxide poisoning.

- Monitor vital signs; pulse oximetry is not reliable in patients with CO poisoning

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider IV access
  - → D03: Vascular Access and Fluid Administration
  - Consider fluid bolus to correct hypoperfusion or hypotension if clinically indicated

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Maintain fluid and electrolytes; treat severe acidosis; a slight acidosis may be beneficial by shifting the oxyhemoglobin dissociation curve to the right
  - → D03: Vascular Access
- Avoid alkalosis
- Administer glucose as prophylaxis against hypoglycemia (intracellular glucose may be decreased even in presence of normal or elevated blood glucose)
  - → E01: Hypoglycemia and Hyperglycemia
- Obtain COHb level if patient was exposed to smoke from fire; consider concurrent cyanide toxicity
  - In *mild* exposures, 100% oxygen should continue until patient is asymptomatic and COHb levels are < 5-6%
  - To protect fetus, pregnant patients not receiving HBO may need to continue 100% oxygen 5 times longer than time required to reduce maternal COHb to < 5-6%
  - In *moderate and severely* poisoned patients who are not candidates for HBO, 100% oxygen may need to be continued for 24 hours after symptoms resolve
- Hypotension unresponsive to IV fluids may require vasopressors
- Seizures should be treated with IV benzodiazepines
  - → F02: Seizures
- Treat cerebral and pulmonary edema supportively

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Monitor electrolytes, glucose, renal and liver function, creatine kinase
- Monitor ECG, troponin, blood gases and serum lactate levels in symptomatic patients
- Obtain methemoglobin level if patient was exposed to smoke from fire; consider concurrent cyanide toxicity
- Consider transport to a hyperbaric unit.

Evidence Based Practice

Carbon Monoxide

Supportive

- Oxygen

Neutral

- Direct Transport To Hyperbaric Facility

Against

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J03: Cyanide

Robert MacMillan

Updated: May 27, 2021
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Introduction

Cyanide is a molecule consisting of a carbon atom triply bonded to a single nitrogen atom. It can form compounds which are also known as cyanides. It is both naturally occurring and synthetic with many cyanide-containing compounds resulting in powerful, fast acting poisons.

Hydrogen cyanide is a colourless gas with a faint, bitter, almond-like odor. Sodium cyanide and potassium cyanide are both white solids with similar odours in damp air. Cyanide salts and hydrogen cyanide are used in electroplating, metallurgy, the production of organic chemicals, photography, plastics manufacturing, the fumigation of ships, and some mining processes. Fires involving modern building materials, plastics, and furnishings can also produce large amounts of cyanide, and individuals exposed to the smoke from these fires can have significant cyanide exposures.

Essentials

- ClinCall consultation required when attending cases of suspected cyanide exposure.
- Rescue of unconscious victims exposed to cyanide gas must only be done by trained personnel equipped with self-contained breathing apparatuses and protective clothing.
- Patients must be decontaminated. Remove clothing to limit off-gassing and secondary contamination.
- Severe, acute cyanide poisoning is usually associated with rapid onset of central nervous system symptoms, including unconsciousness and seizures. Cardiovascular effects, such as hypotension and tachycardia, and metabolic acidosis, are common.
- Hydrogen cyanide and the inorganic cyanide salts rapidly produce symptoms following acute exposure. Death may occur within minutes. Exposure to cyanide-containing compounds may result in a delayed onset of symptoms.
- Hydroxocobalamin is the first-line antidote to cyanide poisoning.

Additional Treatment Information

- Topical exposure to concentrated solutions of cyanide salts can cause skin burns as well as systemic toxicity. Skin flushing may be observed from systemic effects. Remove and dispose of contaminated clothing. Flush skin and eyes thoroughly with soap and water and treat symptomatically as for ingestion.
- Inhalation of cyanide-containing gases produce respiratory tract irritation. Massive exposure may cause a sudden loss of consciousness and death from respiratory arrest within minutes. Cyanogen chloride can cause delayed pulmonary edema.

Referral Information

Asymptomatic patients should be monitored for at least six hours following acute exposure. The monitoring period should be extended to at least 24 hours following exposure to nitriles or cyanide-releasing compounds. Conveyance is mandatory.

General Information

- Signs and symptoms of cyanide toxicity include:
  - Tachycardia, mild transient hypertension progressing to hypotension, bradycardia, and cardiovascular collapse
  - Tachypnea is common initially with progression to respiratory depression and respiratory arrest; pulmonary edema may develop
  - Headaches, anxiety, dizziness, agitation and confusion are common in early stages; patients may become obtunded or seize
  - Nausea and vomiting may develop; ingestion of caustic, alkaline cyanide salts may cause gastrointestinal bleeding
  - Metabolic acidosis with hyperlactatemia is characteristic of severe cyanide poisoning; hyperglycemia may also occur
- Cyanide inhibits the activity of cytochrome oxidase A3 in the mitochondria, preventing aerobic respiration. The resulting shift to anaerobic metabolism produces an excess of lactate. Effects are most prominent in brain and cardiovascular tissues.
- Cyanides are rapidly absorbed by ingestion, inhalation, and through contact with mucosal membranes. Symptoms may be seen within seconds to minutes of exposure.

- Air concentrations of 200-300 ppm of hydrogen cyanide may be rapidly fatal.
- The "bitter almond" odour of hydrogen cyanide is not a reliable indicator of danger – many individuals are unable to detect this odour.
- The estimated lethal dose to an adult is 50 mg of hydrocyanic acid and 200-300 mg of an inorganic cyanide salt.
- Patients have survived > 1 g potassium cyanide ingestion with prompt antidote therapy.

Interventions

First Responder

- Remove patient and decontaminate as required
  - Remove and dispose of clothing
  - Flush exposed skin and mucosal membranes with soap and water
  - → PR05: Patient Decontamination
  - If eyes are involved, flush with a gentle stream of water for at least 15 minutes
- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Protect the airway and assist ventilations as necessary
  - → B01: Airway Management
- Provide supplemental oxygen via non-rebreather face mask
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

CliniCall consultation required when attending cases of suspected cyanide exposure.

- Convey with notification

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access and treatment of hypotension
  - → D03: Vascular Access

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider push-dose EPINEPHrine for hypotension refractory to fluids
- Control seizures if necessary
  - → F02: Seizures

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Hydroxocobalamin
- Correct metabolic acidosis
- Seizures refractory to benzodiazepines should be managed with barbiturates

References

1. Agency for Toxic Substances and Disease Registry (ATSDR). [Link]
2. ATSDR - Division of Toxicology and Human Health Sciences (DTHHS). 2018. [Link]
3. British Columbia Drug and Poison Information Centre. [Link]

J04: Hydrogen Sulfide

Robert MacMillan

Updated: June 02, 2021
Reviewed: March 01, 2021

Introduction

Hydrogen sulfide (H_2S) is a colourless gas with a characteristic odor of rotten eggs that is a product of the decomposition of sulfur-containing organic materials. It occurs naturally in fossil fuel deposits, sulfurous rocks, and is also released from hot tar and asphalt. Accidents involving H_2S have occurred in mines, caves, oil fields, petroleum refineries, sewers, liquid manure storage tanks, agricultural facilities, and the cargo holds of fishing boats.

Chemical suicides using common household products to create H_2S gas are becoming more common.

The toxicity of H_2S depends on the concentration and the duration of exposure. Most deaths occur at the scene as a result of respiratory paralysis, also known as "knockdown." Trauma may also occur as a result of falls following a loss of consciousness.

Essentials

- CliniCall consultation required when attending cases of suspected H2S exposure.
- Prompt rescue and treatment can save lives. Rescue of unconscious victims must only be undertaken by trained personnel equipped with self-contained breathing apparatuses and appropriate protective clothing. Atmospheric gas monitoring is mandatory.
- Decontamination is required. Remove and dispose of clothing.
- Inhalation of high concentrations of H_2S causes immediate respiratory paralysis and a rapid loss of consciousness, followed shortly after by death from asphyxia.
- Patients who are ventilated immediately following rescue often recover completely. Those who remain unconscious for longer periods of time are at risk for permanent hypoxic brain injuries.

Additional Treatment Information

- Early endotracheal intubation and mechanical ventilation with high concentrations of oxygen is recommended in patients with central nervous system depression or respiratory distress.
- Patients with respiratory paralysis may not begin breathing spontaneously for hours.
- Aspiration and pulmonary edema may develop in severe cases.

Referral Information

Patients who are asymptomatic should be observed for at least several hours following exposure.

General Information

- H_2S is highly toxic. The characteristic odour of the gas is an unreliable predictor of danger; prolonged exposure to low concentrations of H_2S, or brief exposures to higher concentrations, results in olfactory fatigue and renders individuals insensitive to the smell.
- At concentrations between 50-100 ppm, H_2S is irritating to lungs, mucosal membranes, and eyes. Prolonged exposure at this level may cause pulmonary edema.
- Concentrations > 500 ppm may produce severe toxicity within minutes. A single breath at concentrations between 800-1,000 ppm may be rapidly fatal.
- The toxicity of H_2S is due to its ability to paralyze respiratory muscles and produce profound hypoxia.

Interventions

First Responder

- Decontaminate patients in open air
  - → PR05: Patient Decontamination
  - Flush exposed skin and eyes with warm water
- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Provide supplemental oxygen and ventilation as required; use high-flow devices; provide airway management as required
  - → B01: Airway Management
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- CliniCall consultation required when attending cases of suspected H2S exposure for hazard control and care planning purposes.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider CPAP or PEEP for patients with developing pulmonary edema
  - → PR09: Continuous Positive Airway Pressure
  - → PR10: Positive End Expiratory Pressure
- Consider vascular access and fluid replacement for hypotension
  - → D03: Vascular Access

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Apply a staged approach to oxygenation and ventilation in cases of significant CNS depression
- Control seizures as required
  - → F02: Seizures

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider sodium nitrite
- Contact DPIC (1-800-567-8911) or ETP for additional guidance

J05: Organophosphates and Carbamates

Robert MacMillan

Updated: June 02, 2021
Reviewed: March 01, 2021

Introduction

Organophosphates and carbamates are groups of related chemicals commonly used as pesticides to control insects. Some preparations are approved for veterinary use to control fleas and other parasites. They are commonly formulated as dusts, granules, emulsions, suspensions, or solutions. Concentrates are often formulated in a petroleum distillate base.

Clinically, poisonings from organophosphates and carbamates are similar to each other, resulting in the inhibition of acetylcholinesterase, causing stimulation of muscarinic and nicotinic receptors. Carbamate toxicity is generally of shorter duration as its effect on acetylcholinesterase is reversible.

Deaths from these products occur as a result of acute respiratory failure.

Essentials

- Paramedics and EMRs must contact CliniCall to discuss the case, ideally prior to arrival on scene.
- Decontamination requirements can be complex and must be completed prior to moving the patient to the ambulance for treatment.
  - → PR05: Patient Decontamination
- Attempt to identify the name and amount of the substance the patient was exposed to, including the pesticide control number, WHMIS information, or photo of the label. This can be relayed to CliniCall for additional information.
- Health care staff, including paramedics and EMRs/FRs, should wear protective clothing when handling contaminated clothing and grossly contaminated patients.
- Treatment should be directed at decontamination, administration of antidotes where available, and support for oxygenation and ventilation.

Additional Treatment Information

- Activated charcoal may be considered in hospital for up to one hour post-ingestion.
- High doses of atropine, in conjunction with pralidoxime, may be required in cases of severe organophosphate poisoning.

General Information

- Organophosphate pesticides include: acephate; azinphos-methyl; chlorpyrifos; diazinon; dichlorvos; dimethoate; fenthion; malathion; methamidophos; naled; phorate; propetamphos; terbufos; tetrachlorvinphos; and trichlorfon.
- Carbamates include: bendiocarb; carbaryl; carbofuran; formetanate; methomyl; oxamyl; and propoxur.
- Products may be labeled as “systemic” or “contact” – this refers to the action of the pesticide and whether it is taken into plant tissues. It has no bearing on human toxicity.
- The onset of symptoms is usually within minutes to hours after exposure. Symptoms may be delayed in the case of skin exposure.
- Symptoms can be divided into muscarinic effects (miosis, excessive sweating and bronchial secretions, bradycardia, hypotension) and nicotinic effects (mydriasis, tachycardia, fasciculations, muscle weakness, paralysis). Central nervous system effects can include headache, drowsiness, seizures, and unconsciousness.
  - Muscarinic receptors are predominantly in the parasympathetic nervous system whereas nicotinic receptors are primarily in the sympathetic nervous system.
- A useful mnemonic for organophosphate toxicity is SLUDGEM/BBB:
  - Salivation
  - Lacrimation
  - Urination
  - Defecation
  - GI upset
  - Emesis

- Miosis
- Bronchorrhea
- Bronchospasm
- Bradycardia
- The three "Bs" – bronchorrhea, bronchospasm, and bradycardia – are the most common causes of death in organophosphate and carbamate poisoning.

Interventions

First Responder

- Maintain a safe working environment:
- Decontaminate as per CliniCall, fire department, or hazardous materials specialist on scene
  - → PR05: Patient Decontamination
- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Provide airway management and support for oxygenation and ventilation as required
  - → B01: Airway Management
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- CliniCall consultation required for guidance, ideally prior to arrival on scene.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider extraglottic device for profoundly unconscious patients (may require removal for suctioning purposes)
  - → PR08: Supraglottic Airways
- Obtain vascular access
  - → D03: Vascular Access

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Manage seizures
  - → F02: Seizures
- Treat dysrhythmia and chest discomfort as per CPGs
  - → C01: Acute Coronary Syndromes
  - → C02: Bradycardia
  - → C03: Narrow Complex Tachycardia
  - → C04: Wide Complex Tachycardia
- Consider magnesium sulfate for management of ventricular tachycardia (likely caused by QTc prolongation from organophosphates)
- Atropine:
  - Double the dose every five minutes until effect is seen
  - The goal is to control secretions and correction of significant bradycardia and hypotension; secretions respond more slowly than bradycardia
  - Atropine will reverse muscarinic symptoms but will not alter nicotinic effects

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Intubate if necessary
- Provide mechanical ventilation as required
- Consider obtaining pralidoxime from a hospital while en route to call:
  - Call ETP prior to pralidoxime
  - Do not administer pralidoxime without concurrently giving atropine
    - Adults:

        - Loading dose: 1 – 2 g IV infused over 30 minutes
        - May be given by direct IV injection over 5 minutes in severely poisoned patients
        - First dose may be given IM if IV access is not possible
        - Maintenance dose: continuous infusions preferred; optimal dose not established; 500 mg/hr is often recommended; consider 8-10 mg/kg/hr (as per WHO guidance); lower rates may be adequate; titrate to response
    - Children:
        - Loading dose: 20-50 mg/kg
        - May also be given by direct IV injection over 5 minutes, or IM if IV access cannot be obtained
        - Maintenance dose: 10-20 mg/kg/hr
    - Therapeutic endpoint: control of nicotinic symptoms
    - Treatment for 24-48 hours is usually sufficient in many cases; prolonged treatment (i.e., several weeks) may be required in severe poisoning
    - Discontinue when patients no longer require ventilatory support
  - Pralidoxime use in carbamate poisoning is controversial; indicated for use in mixed organophosphate/carbamate poisoning
  - Risk of serious adverse effects (laryngospasm, hypertension) increases with rapid IV administration
  - May precipitate myasthenic crisis in patients with myasthenia gravis; may cause toxicity of carbaryl, a carbamate insecticide
- May consider glycopyrrolate for organophosphate symptoms if atropine is ineffective or unavailable

Evidence Based Practice

Pesticide Poisoning

Supportive

Neutral

- Atropine

Against

J06: Radionuclear Incidents

Michelle Haig and Mike Sugimoto

Updated: May 27, 2021
Reviewed: March 01, 2021

Introduction

Radiological and nuclear incidents are related, but separate events.

In radiological events or accidents, individuals are exposed to radiation, or contaminated by radioactive material. This can occur as a deliberate act, as in the use of an explosive radiological dispersal device – which is any device that is designed to spread radioactive material around an area using either explosives or a compressed gas – or through exposure to radioactive material or generating devices, such as sealed sources, x-ray devices, or accelerators. Individuals exposed in these incidents may have no knowledge of their exposure until some time later.

Critical assemblies, or criticality events, occur when sub-critical masses of fissile material are brought together, inadvertently starting a chain reaction. This results in the creation of an unshielded nuclear reactor and produces significant amounts of radiation. There is no explosion, although substantial heat may be produced.

Nuclear incidents involve a chain reaction (fission) which can be accidental, or result from the intentional detonation of a nuclear weapon. Detonations are accompanied by widespread blast and heat. Exposed individuals will generally notice when this happens.

With the exception of deliberate weapons-related events (i.e., the bombings of Hiroshima and Nagasaki and national nuclear weapons tests), every radiation-related incident involving members of the public has been a radiological event. Critical assemblies have been limited to research and industrial sites.

Essentials

- Paramedics and EMRs must contact CliniCall to discuss the case, ideally prior to arrival on scene.
- Skin or wound contamination is rarely life threatening for patients or health care personnel.
- Removal of the outer layer of clothing and shoes typically reduces external contamination by 90%.
- The goal of decontamination is to remove as much contaminated material as possible without damaging the skin or creating adverse effects.
- Decontamination can be accomplished without radiological monitoring if necessary.
- Subsequent decontamination cycles may be necessary. There is no single target value for decontamination appropriateness for all circumstances. Generally, decontamination is "successful" when survey meters show less than 2 or 3 times the normal background radiation or when further efforts stop an increase in the count rate significantly.
- Internal contamination, and incorporation of radioactive materials into body tissues, may occur and require additional treatment.

General Information

Radiation Precautions

- Individuals who have been exposed to ionizing radiation, but who have not come into contact with radioactive material, are neither contaminated nor radioactive. They do not require radiation precautions.
- In patients with known or suspected external or internal contamination, paramedics and EMRs/FRs should don gown, masks, cap, boots, and gloves. The patient should be isolated to the maximal extent possible. Avoid touching surfaces or items unnecessarily.

Burns

- Both thermal and radiation burns can occur in radiological incidents. Thermal burns with radiation exposure are a "combined injury," for which the prognosis is worse than burn or radiation exposure alone.
- Cool burns as required. Be aware of the risk of hypothermia.
- Radiation burns may occur in patients undergoing radiation therapy or who have had extensive fluoroscopy procedures. These do not benefit from cooling and have complex wound care requirements.

Acute Radiation Syndrome

- Individuals exposed to radiation will develop Acute Radiation Syndrome (ARS) only if all of the following requirements are met:
  - The radiation dose was high
  - The radiation dose was penetrating (i.e., it was able to reach internal organs, such as x-rays or gamma rays)
  - The person's entire body, or most of it, received the dose
  - The radiation was received in a short time, usually minutes; this is most common in industrial accidents and therapeutic misadventures
- There are four subsyndromes of ARS – hematopoietic, gastrointestinal, cutaneous, and neurovascular – and their severity will vary with dose and individual factors.
- High dose whole-body radiation exposure also produces clinically detectable effects in the lungs, liver, and kidneys. Usually, injury to these organs is detected long after ARS manifests itself; individuals would need to survive the earlier injuries for these types of injuries to become life threatening.
- Immune dysfunction, as part of the injury to the hematopoietic system, is also clinically significant if the dose and exposure is severe enough.

Interventions

First Responder

- Decontaminate patient
- → PR05: Patient Decontamination
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Treat life and limb threatening injuries
- Place patient in position of comfort
- Cool burns
- Provide wound care

Emergency Medical Responder – All FR interventions, plus:

- Paramedics and EMRs must contact CliniCall to discuss the case, ideally prior to arrival on scene.
- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → B01: Airway Management
  - → A07: Oxygen Administration
- Manage pain
  - → E08: Pain Management

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access
  - → D03: Vascular Access
- Manage nausea
  - → E07: Nausea and Vomiting

References

1. US Department of Health & Human Services. REMM - Radiation Emergency Medical Management. 2020. [Link]

J07: Beta Blocker Toxicity

Mike Sugimoto

Updated: May 27, 2021
Reviewed: March 01, 2021

Introduction

Beta blockers are widely used in the management of an extensive range of clinical problems, including hypertension, heart failure, migraine headaches, tremors, and aortic dissection. Although overdoses of these medications, either accidental or otherwise, occur infrequently, beta blocker toxicity is associated with significant morbidity and mortality. The primary mechanism for beta blocker toxicity is through the adrenergic blocking action of these medications. Some beta blockers, such as sotalol, propranolol, and acebutolol, have significant pro-arrhythmic tendencies.

Essentials

- As with all poisoning or overdoses, manage the airway and ensure adequate oxygenation and ventilation while a more comprehensive history is obtained.
- Search for and treat reversible causes: do not overlook other causes of the patient's symptoms.
- Out-of-hospital management of beta blocker overdose is limited and specific therapies should only be undertaken in consultation with CliniCall (see ACP interventions below). Rapid conveyance is indicated for virtually all patients.

General Information

- Consider the possibility of co-ingestion of other drugs in patients who are suspected of beta blocker toxicity, particularly calcium channel blockers, digoxin, clonidine, and cholinergic agents.
- Beta blocker toxicity is generally more severe in individuals with a pre-existing cardiovascular history.
- Patients who have overdosed on beta blocking drugs typically become symptomatic within two hours, and virtually all becoming symptomatic within six hours.
- The most common symptoms are bradycardia and hypotension. Myocardial depression and cardiogenic shock can develop in severe cases. Ventricular dysrhythmias are more common with propranolol and sotalol. Mental status changes, such as confusion, delirium, seizures, and unconsciousness, can occur at virtually any point.
- Respiratory depression has been reported. Bronchospasm and hypoglycemia, produced by the beta blockade, can complicate management.
- Possible electrocardiogram changes include PR elongation, QRS prolongation, and any bradydysrhythmia.

Interventions

First Responder

- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Protect the airway and ensure adequate oxygenation and ventilation
  - → B01: Airway Management
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Measure capillary blood glucose levels
- Initiate conveyance; consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access and fluid bolus; target systolic blood pressure > 90 mmHg; do not give more that 2 L of fluid

  - → D03: Vascular Access
- Correct hypoglycemia if present:
  - → E01: Hypoglycemia and Hyperglycemia

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain and interpret 12-lead ECG
  - → PR16: 12-Lead ECG
- Treat bradycardia:
  - → C02: Bradycardia
  - Atropine; note that atropine may not reverse bradycardia or offer only partial recovery
  - Transcutaneous pacing may be required, though may be ineffective
- Manage seizures:
  - MIDAZOLam
  - See F02: Seizures for additional details
- If airway management is required, *aggressively* attempt to limit peri-procedural hypotension
- → PR18: Anesthesia Induction
- → PR23: Awake Intubation

CliniCall consultation required prior to initiation and to discuss suitability of any of the following therapies:

- Consider glucagon 5 mg slow IV push if available
- Correct ventricular arrhythmias:
  - Consider calcium chloride.
  - Consider sodium bicarbonate in wide complex dysrhythmias
  - Consider magnesium sulfate (particularly in cases of sotalol-induced ventricular dysrhythmia)
  - Consider EPINEPHrine infusion, escalating in consultation with CliniCall; note that higher dose rates may be required to overcome competitive inhibition

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Bradycardia
  - TVP
- Consider IV glucagon
- Consider IV calcium salts
- Consider IV vasopressor (epinephrine)
- Consider IV high-dose insulin and glucose
- Consider IV lipid emulsion therapy

Evidence Based Practice

Overdose-Poisoning

Supportive

- Activated Charcoal
- Naloxone-IM (Opiate OD)
- Naloxone-IN (Opiate OD)
- Naloxone-IV (Opiate OD)
- Naloxone-SQ (Opiate OD)
- Capnography

- Naloxone-Nebulized (Opiate OD)
- Oxygen
- Oxymetry Monitoring
- Sodium Bicarb (TCA OD)

Neutral

- Glucagon (Beta-Blocker OD)
- Treat & Release (Opiate OD)

Against

- Benzodiazepine antagonist (Benzo OD)

References

1. Barrueto F. Beta blocker poisoning. In UptoDate. 2020. [Link]

J08: Tricyclic Antidepressant Toxicity

Mike Sugimoto

Updated: June 02, 2021
Reviewed: March 01, 2021

Introduction

Although not as commonly used for their original purpose, tricyclic antidepressants (TCAs) remain in use for the treatment of depression and other conditions.

Essentials

- TCA overdose produces sedation, unconsciousness, and seizures. Tachycardias, including wide complex tachycardias, and hypotension are common.
- Patients who have overdosed on TCAs can deteriorate rapidly. Urgent conveyance with appropriate preparation should be undertaken.
- As with most poisonings or overdoses, care for TCA toxicity is primarily supportive. Protect the airway, provide supplemental oxygen, maintain effective ventilation, and support blood pressure as necessary.
- ECG monitoring can be helpful in identifying cardiac rhythm disturbances common to TCA overdose. Consider ACP intercept where available.
- Consider the possibility of co-ingestion of other medications or substances. Care more generally for the patient than for any particular poison.

Additional Treatment Information

- Patients who have overdosed on TCAs are frequently hypotensive. Fluid resuscitation should be initiated in patients who are significantly hypotensive; unmanaged hypotension is a primary cause of mortality in these patients.
- Sodium bicarbonate should be considered, in consultation with CliniCall, when the QRS interval exceeds 100 ms or the QRS morphology is grossly distorted.
- As a general rule, antiarrhythmics should be avoided in TCA overdose: their interactions with a disordered heart are unpredictable and most have been poorly studied. Magnesium *may* be an acceptable antiarrhythmic in the context of cardiac arrest, but should only be given in consultation with CliniCall.

General Information

- TCA overdoses carry several important clinical consequences; the most significant is the blockade of fast sodium ion channels in the heart.
- The clinical course of a TCA poisoning is unpredictable due to complexities with uptake from the gastrointestinal tract, bioavailability, and drug metabolism. Patients may initially appear well, but deteriorate rapidly and without warning.
- Signs of TCA poisoning typically include sedation, but may also feature confusion, delirium, and hallucinations. Anticholinergic effects, such as hyperthermia, flushing, and dilated pupils are common. Hypotension is the most ominous finding; the majority of patients who die from TCA overdose do so as a result of refractory, uncorrectable hypotension.
- ECG findings in TCA overdose include:
  - QRS > 100 ms
  - Deep S waves in leads I, aVL
  - Tall R waves in lead aVR
  - Tachycardias, including sinus tachycardia

Interventions

First Responder

- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Protect the airway and ensure adequate oxygenation and ventilation

- → B01: Airway Management
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Support ventilation as required
- Obtain and measure capillary blood glucose
- Initiate conveyance; prepare for acute deterioration en route
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypotension and hypoglycemia
  - → D03: Vascular Access
  - → E01: Hypoglycemia and Hyperglycemia

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain and interpret 12-lead ECG
  - → PR16: 12-Lead ECG
- ClinCall consultation required prior to initiation and to discuss suitability of any of the following therapies:
  - Consider sodium bicarbonate; assess for QRS narrowing following administration
  - Consider push-dose EPINEPHrine for hypotension refractory to fluid bolus
  - Magnesium sulfate *may* be an acceptable antiarrhythmic in the context of cardiac arrest

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider sodium bicarbonate infusion (37.5 mEq/hr) if initial bolus dose of sodium bicarbonate was effective at narrowing QRS complex
- Consider norepinephrine for refractory hypotension

Evidence Based Practice

Overdose-Poisoning

Supportive

- Activated Charcoal
- Naloxone-IM (Opiate OD)
- Naloxone-IN (Opiate OD)
- Naloxone-IV (Opiate OD)
- Naloxone-SQ (Opiate OD)
- Capnography
- Naloxone-Nebulized (Opiate OD)
- Oxygen
- Oxymetry Monitoring
- Sodium Bicarb (TCA OD)

Neutral

- Glucagon (Beta-Blocker OD)
- Treat & Release (Opiate OD)

Against

- Benzodiazepine antagonist (Benzo OD)

J09: Calcium Channel Blocker Toxicity

Mike Sugimoto

Updated: March 22, 2024
Reviewed: March 01, 2021

Introduction

Calcium channel blockers, commonly used to treat hypertension and cardiac dysrhythmias, have a significant risk of toxicity if used inappropriately.

Essentials

- As with most poisonings, out-of-hospital management options are limited. Protect the airway, ensure optimal oxygenation, support ventilation as necessary, and attempt to correct hypotension. Care more generally for the patient than for the specific suspected poison.
- Hypotension and bradycardia are common findings.
- Be aware of the possibility of co-ingestion of other medications or substances.
- Pre-existing heart disease and myocardial ischemia can cause symptoms similar to calcium channel blocker overdose and must be excluded.

Additional Treatment Information

- As a first-line treatment, a fluid bolus of 500 mL should be given to any patient suspected of having overdosed on calcium channel blockers who is hypotensive, and may be repeated as necessary up to 1 L.
- Atropine should be considered in patients who are bradycardic, repeated as necessary, up to a total dose of 3 mg.
- Intravenous calcium (either calcium chloride or calcium gluconate) may overcome the cardiovascular effects of calcium channel blockers. Intravenous administration of 1-2 grams can be provided over 10 minutes.

General Information

- Calcium channel blockers can be divided into two categories: the dihydropyridines, which block L-type calcium channels in the vasculature, and the non-dihydropyridines, which act on calcium channels in the myocardium.
  - The dihydropyridines include nifedipine, amlodipine, and felodipine. They are potent vasodilators and have limited effect on cardiac contractility or conduction. The non-dihydropyridines, diltiazem and verapamil, act more centrally and are more likely to directly affect cardiac output.
- In general, dihydropyridine drugs are more likely to cause arterial vasodilation and tachycardia, whereas diltiazem and verapamil tend to produce bradycardia and poor contractility.
- The changes in myocardial contractility may induce symptoms of heart failure. Carefully evaluate patients for signs of myocardial dysfunction, including shortness of breath and pulmonary edema.
- Patients who have overdosed on calcium channel blockers may have significant hyperglycemia. This is clinically insignificant, but may assist in diagnosis. Obtain and record a capillary blood glucose measurement.
- Epinephrine infusions may be required for patients whose hypotension and bradycardia are refractory to atropine and calcium. Profound calcium channel blocker toxicity may require significantly higher doses and dose rates than might otherwise be expected. Titrate drug doses to effect; be aware of arrhythmogenic potential.

Interventions

First Responder

- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Protect the airway and ensure adequate oxygenation and ventilation
  - → B01: Airway Management
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Obtain capillary blood glucose measurement
- Initiate conveyance; consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypotension
  - → D03: Vascular Access

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- For bradycardia:
  - Atropine; repeated as necessary
  - → C02: Bradycardia
- CliniCall consultation required prior to initiating any of the following therapies.
  - Calcium chloride 1-2 g IV over 10 minutes
  - Consider push-dose EPINEPHrine or infusion for hypotension refractory to calcium chloride
- Consider glucagon 5 mg slow IV push if available

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider Norepinephrine
- Consider Glucagon IV 1-5 mg IVP (up to 15 mg)
- Consider lipid emulsion therapy 20% solution
  - Call ETP prior to lipid emulsion therapy
  - Bolus 1.5 ml/kg over 2 minutes
  - Infusion 1.5ml/kg over 60 minutes
- For bradycardia
  - Call ETP prior to TVP therapy
  - TVP
- Consider high dose insulin and glucose therapy

Evidence Based Practice

Overdose-Poisoning

Supportive

- Activated Charcoal
- Naloxone-IM (Opiate OD)
- Naloxone-IN (Opiate OD)
- Naloxone-IV (Opiate OD)
- Naloxone-SQ (Opiate OD)
- Capnography
- Naloxone-Nebulized (Opiate OD)
- Oxygen
- Oxymetry Monitoring
- Sodium Bicarb (TCA OD)

Neutral

- Glucagon (Beta-Blocker OD)
- Treat & Release (Opiate OD)

Against

- Benzodiazepine antagonist (Benzo OD)

References

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J10: Acetaminophen Toxicity

Mike Sugimoto

Updated: July 26, 2021
Reviewed: March 01, 2021

Introduction

Acetaminophen is the most widely used analgesic and antipyretic in the world and is found in a wide range of over-the-counter products. It is a generally safe drug, but overconsumption can lead to significant harm, particularly to the liver. It is the most common cause of acute liver failure and responsible for a significant fraction of all liver transplants.

Accidental acetaminophen overdose is more common among individuals who have low levels of health literacy and who do not recognize its prevalence in multiple products.

Essentials

- In early stages, acetaminophen has no readily observable toxidrome. In the out-of-hospital environment, acetaminophen overdose is most likely diagnosed through history taking, both from the patient and collaterally. Always consider the possibility of co-ingestion of other drugs or substances.
- To the extent that acetaminophen toxicity offers signs and symptoms, they are generally non-specific: nausea and vomiting; malaise; lethargy; pallor; and diaphoresis, associated with right upper quadrant abdominal pain. Patients with significant liver injury may remain asymptomatic for hours prior to their deterioration.
- Single ingestions greater than 250 mg/kg (or more than 12 g in 24 hours) are likely to cause toxicity, but injury can occur at lower doses.
- Individuals with pre-existing liver disease are at increased risk of acetaminophen toxicity and can experience significant liver dysfunction, even with doses of acetaminophen that are generally considered safe.
- Provide supportive care for patients.

Additional Treatment Information

- The specific antidote to acetaminophen, N-acetylcysteine, is a hospital-based therapy that requires diagnostic testing not available in the out-of-hospital environment.
- Administration of activated charcoal within four hours of ingestion may help reduce the need for N-acetylcysteine treatment and limit the degree of liver injury. Paramedics and EMRs/FRs identifying an acetaminophen overdose should consider the timing of ingestion and strive to deliver these patients to a hospital in a timely fashion.

Referral Information

Because of its high potential for toxicity, as well as its delayed onset of symptoms, patients suspected of acetaminophen overconsumption should be conveyed to hospital.

General Information

- There are essentially no signs or symptoms that are unique to acetaminophen overdose. Diagnosis is made on the basis of a history of ingestion combined with serum acetaminophen.

Interventions

First Responder

- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Provide supplemental oxygen where indicated
  - → A07: Oxygen Administration

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider N-acetylcysteine
  - Call ETP prior to N-acetylcysteine
  - Administer an initial loading dose of 150 mg/kg IV over 60 minutes.
  - Next, administer a dose of 50 mg/kg over four hours (infusion at 12.5 mg/kg **per hour** IV for four hours).
  - Finally, administer a dose of 100 mg/kg over 16 hours (infusion at 6.25 mg/kg **per hour** IV for 16 hours).
- Significant Troponin levels may occur. This is an ominous late sign of cardiogenic disfunction.
  - Consider Inotropic support if required
    - Dobutamine
    - Milrinone
  - Consider vasopressor support if required
    - Epinephrine
    - Levophed
    - Dopamine
    - Vasopressin

References

1. Burns M, et al. Acetaminophen (paracetamol) poisoning in adults: Pathophysiology, presentation, and evaluation. In UpToDate. 2020. [Link]
2. Heard K, et al. Acetaminophen (paracetamol) poisoning in adults: Treatment. In UpToDate. 2020. [Link]
3. Heard K, et al. Management of acetaminophen (paracetamol) poisoning in children and adolescents. In UpToDate. 2020. [Link]

J11: Marijuana and Cannabis Products

Mike Sugimoto

Updated: May 25, 2021
Reviewed: March 01, 2021

Introduction

With the advent of legalization in Canada, marijuana and marijuana-containing products are increasingly available to adult consumers.

Essentials

- Although marijuana is generally considered to be low risk, adverse effects can still occur. The most common signs and symptoms of overconsumption include anxiety, paranoia, panic, tachycardia, confusion, dry mouth, and nausea and vomiting.
- Because of their delayed onset, individuals are far more likely to over-consume edible marijuana products.
- Children are particularly at risk from ingested cannabis products.
- Cannabinoid hyperemesis syndrome is the most significant acute complication of marijuana use.

General Information

- The majority of individuals who experience adverse reactions to cannabis can be managed with gentle, supportive care and reassurance only. Symptoms are generally self-limiting and resolve gradually over a period of hours.
- Children who have consumed cannabis-containing products may develop significant and profound central nervous system depression. Hyperkinesis may occur despite apparent coma. Provide supportive care to these patients, ensuring a patent airway and effective oxygenation and ventilation.
- Cannabinoid hyperemesis syndrome is a cyclical vomiting syndrome that occurs primarily in individuals who use significant quantities of cannabis, generally on a daily basis. It involves a prodromal phase, where individuals feel vaguely unwell and mildly nauseated, followed by a hyperemetic phase with persistent nausea and vomiting. People suffering from cannabinoid hyperemesis syndrome often report that hot water (bathing or showering) improves their symptoms; some evidence suggests that use of a capsicum cream rubbed on the abdomen may also attenuate the nausea. Supportive care, including fluid replacement and anti-emetic medications, can be helpful; ultimately, cessation of cannabis use and time will allow symptoms to resolve.

Interventions

First Responder

- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Provide airway management and supplemental oxygen as required
  - → B01: Airway Management
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Measure capillary blood glucose and manage hypoglycemia as required
  - → E01: Hypoglycemia and Hyperglycemia

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access in cases of persistent vomiting
  - → D03: Vascular Access
- Consider antiemetic:
  - → E07: Nausea and Vomiting

References

1. Wang GS. Cannabis (marijuana): Acute intoxication. In UpToDate. 2020. [Link]

J12: Opioids

Mike Sugimoto

Updated: September 29, 2023
Reviewed: September 29, 2023

Introduction

Opioid overdose is the most commonly seen toxidrome in out-of-hospital practice in British Columbia, which is, as of 2020, in its fourth year of a public health emergency. Contamination of the illicit drug supply with powerful, synthetic opioids, such as fentanyl, is largely responsible for the crisis. This contamination makes consumption of any illicit drug extremely dangerous.

In 2018, 1,510 overdose deaths were recorded in the province, which represents more than four times the number of fatalities from motor vehicle collisions.

Essentials

- Opioid toxicity should be suspected in any individual with a decreased level of consciousness and depressed respirations or apnea.
- Assisted ventilation is the cornerstone of management. Paramedics and EMRs/FRs must ensure that proper airway management, including effective ventilations, continue until symptoms have resolved; this must supersede any pharmaceutical interventions. Consider the use of airway adjuncts to facilitate ventilation. Monitor oxygenation at all times.
- Assess for and treat hypoglycemia.
- The goal of naloxone administration is the restoration of adequate respirations – a return of full consciousness is not necessary.

Additional Treatment Information

- Cardiac arrests related to opioid use are primarily hypoxic. Naloxone is unlikely to benefit these patients and its routine use is unsupported by current evidence. Paramedics and EMRs/FRs must focus instead on effective ventilation, oxygenation, and chest compressions. In rare cases, patients may present with pulses that are difficult to palpate. If unsure whether a patient has a pulse, begin compressions and ventilations and evaluate the response to these treatments (e.g., oxygen saturation, heart rate, presence of central or peripheral pulses) before considering the use of naloxone.
- Effective ventilation and oxygenation are key to the successful management of opioid toxicity. A well-perfused, well-oxygenated brain that receives naloxone will be more likely to recover gracefully.
- Paramedics and EMRs/FRs must differentiate between overdoses of recreational opioids and overdoses of prescribed medication. In the case of opioid overdose from a patient's prescribed medication, a careful clinical history of opioid use must be elicited and naloxone should be administered judiciously to avoid precipitating a pain crisis or significant withdrawals.
    - In patients with palliative needs, who are presenting with respiratory depression due to opioids, there is a need to ensure adequate oxygenation while maintaining analgesia and avoiding rapid opioid withdrawal. In these patients, the administration of naloxone as a bolus, rather than titrating to respiratory effect, may result in refractory reversal of the opioid analgesia and provoke withdrawal symptoms. *As such it is recommended that the administration of naloxone, at a rate of 0.1 mg IM/IV every two minutes, be titrated to respiratory function, not to the pain or level of consciousness.*
    - See the appropriate palliative care clinical practice guidelines for altered mental status in the context of palliative care. CliniCall consultation is strongly encouraged and collaboration with the rest of the patient's care team is required to manage these cases (1-833-829-4099):
        - → P01: Palliative Care: General
        - → P02: Palliative Care: Delirium
        - → P03: Palliative Care: Pain
- Titrate naloxone to effect. Do not administer subsequent doses of naloxone without allowing the medication time to work and without assessing ventilations. Some substances, particularly the fentanyl analogues such as carfentanil, may require significantly larger doses of naloxone to resolve. Early consultation with CliniCall is recommended in cases where patients do not improve following two doses of naloxone (see FR interventions below).
- Consider the possibility of co-intoxication when assessing patients. Other substances, such as benzodiazepines, gamma hydroxybutyrate, and alcohol can prolong unconsciousness despite resolution of opioid toxicity. Once adequate spontaneous respirations have been re-established, make preparations to convey the patient.
- Pulmonary edema is a known, but rare, complication of naloxone use. If respiratory distress develops following recovery from opioid intoxication, consider the use of CPAP to support oxygenation.
- Patients who wake up following naloxone administration can be confused and violent. Calm reassurance is more helpful in these

cases than confrontation. Violence and combativeness can be reduced by ensuring patients are optimally oxygenated prior to receiving naloxone.

Referral Information

Refusal of care instructions and guidelines must be followed for patients who decline to be conveyed to hospital.

General Information

- Beyond a decreased level of consciousness and depressed respiratory drive, as demonstrated by both decreased rate and limited tidal volume, signs and symptoms of an opioid overdose can include:
  - Pinpoint pupils (miosis)
  - Hypotension
  - Hypothermia
  - Tachycardia
- Intranasal drug administration is of limited benefit in opioid overdoses, as the distribution and uptake of the medication requires ongoing respirations. It may be an acceptable option if parenteral delivery routes are unavailable.
- Patients need not have specifically ingested or otherwise consumed what they believe to be opioids to develop opioid toxicity – many recreational drugs are contaminated with synthetic opioids, and users frequently have no way to establish the safety of their substances. Black-market prescription medications, cocaine, methamphetamine, and GHB, have all been associated with opioid contamination and users of these substances have died as a result of consumption. Paramedics and EMRs/FRs should rely on the clinical signs and symptoms of opioid toxicity and manage patients accordingly, regardless of the history available at the scene.
- Drug supply contamination can be caused by multiple agents, of which fentanyl is the most common. Other fentanyl analogues, of varying potency, have been found in the supply of illicit drugs. Contaminated supply "outbreaks" occur randomly and can produce waves of overdoses and overdose fatalities.
- Questioning patients about specific quantities of substances used is unlikely to be helpful.
- Patients should be screened for the risk of additional opioid intoxication and they (or their friends and family members) educated on the use of naloxone kits. Distribute kits to patients and families in accordance with BCEHS policy. Referral pathways for treatment may be available in some regions of British Columbia and these should be utilized wherever and whenever possible.
- Refer cases of children with opioid toxicity to the Ministry of Children and Family Development in accordance with BCEHS policy.

Interventions

First Responder

- Manage the airway and support ventilations with bag-valve mask as required; consider the use of 2-person BVM techniques with appropriate airway adjuncts
  - → B01: Airway Management
- Administer high flow oxygen
  - → A07: Oxygen Administration
- Obtain capillary blood sample and assess for hypoglycemia
  - → E01: Hypoglycemia and Hyperglycemia
- Reverse opioid toxicity:
  - Naloxone

Emergency Medical Responder – All FR interventions, plus:

- Consider the use of nasopharyngeal airways in patients whose level of consciousness precludes an oropharyngeal airway
  - → PR07: Nasopharyngeal Airways

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider placement of supraglottic airway device
  - → PR08: Supraglottic Airways
- Consider intravenous dextrose or intramuscular glucagon for hypoglycemia
- In cases of continued unconsciousness and apnea, consider establishing vascular access and giving naloxone intravenously

- [→ D03: Vascular Access]

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider fifth dose (4 mg) of naloxone
- ClinCall consultation required prior to sixth dose (10 mg) of naloxone
  - Note that, depending on supplies and resources available, this intervention may not be feasible

Evidence Based Practice

Overdose-Poisoning

Supportive

- Activated Charcoal
- Naloxone-IM (Opiate OD)
- Naloxone-IN (Opiate OD)
- Naloxone-IV (Opiate OD)
- Naloxone-SQ (Opiate OD)
- Capnography
- Naloxone-Nebulized (Opiate OD)
- Oxygen
- Oxymetry Monitoring
- Sodium Bicarb (TCA OD)

Neutral

- Glucagon (Beta-Blocker OD)
- Treat & Release (Opiate OD)

Against

- Benzodiazepine antagonist (Benzo OD)

References

1. Kolinsky D, et al. Is a prehospital treat and release protocol for opioid overdose safe? 2017. [Link]
2. Levine M, et al. Assessing the risk of prehospital administration of naloxone with subsequent refusal of care. 2016. [Link]
3. Rudolph SS, et al. Prehospital treatment of opioid overdose in Copenhagen—Is it safe to discharge on-scene? 2011. [Link]
4. Wampler DA, et al. No deaths associated with patient refusal of transport after naloxone-reversed opioid overdose. 2011. [Link]
5. Willman MW, et al. Do heroin overdose patients require observation after receiving naloxone? 2017. [Link]

Practice Updates

- 2023-09-29: updated FR interventions

J13: Button Battery Ingestion

Stuart Woolley

Updated: October 06, 2022
Reviewed: September 29, 2022

Introduction

To understand the pathophysiology of button battery ingestion (BBI), it is important to understand the basic principles of batteries. Batteries produce electricity using two different metals in a chemical substance known as an “electrolyte”. An electrolyte simply means a substance that can be broken down by electrolysis. Each battery contains two different metals which create a chemical reaction. During this reaction, one metal will lose more electrons than the other.

When a button battery becomes impacted within the esophagus, or the digestive tract, the body's mucosa serves as a circuit between the two electrical terminals (+/-) of the battery. This circuit allows for the the electrons freed in the one metal to flow into the other metal, balancing the electrical charge.

The electrical current that is now flowing through the tissues results in the generation of hydroxide radicals in the body’s tissues. This presents a serious risk to patients as hydroxide radicals are associated with a rapid rise in pH far outside normal physiological parameters. The result is caustic injury and subsequent coagulative necrosis. This can weaken the esophageal wall in a short amount of time. As the injuries are caustic in nature, there is significant probability that they will not be isolated to the point of contact and can extend to adjacent tissue, such as the trachea or great vessels.

Risk Factors

First Responders, Emergency Medical Responders, and Paramedics should be aware of the risk of battery ingestion, the presentations, and subsequent management.

There has been an increase in battery ingestion incidents, specifically in children. Over the last 10 years, there has been a 10-fold increase in complications with the likelihood of rapid damage to the body being catastrophic, with 75% of all foreign body ingestions occurring in children, specifically between the ages of 6 months and 3 years of age. Approximately 90% of BBI occurrences resulted in adverse outcomes due to a BB size greater than 20mm in diameter.

A BB size of 20-25mm in diameter carries an increased risk of the BB becoming impacted in the pediatric esophagus compared to the previously standard 15mm and under alkaline BB. The increased voltage in newer lithium cells (3.0 V) is a major contributing factor in the type and degree of harm sustained from ingestion when compared to alkaline cells (1.5 V).

This guideline provides clinicians with the knowledge necessary to quickly recognize this specific emergency, identify environmental and population-based risk factors, and to perform necessary treatment. It is focused on BBI ***only***. Paramedics and EMRs/FRs should refer to other guidelines for the management of airway obstruction, croup, epiglottitis, or anaphylaxis as required:

- → B02: Airway Obstruction
- → B04: Croup and Epiglottitis
- → E09: Anaphylaxis

Essentials

WARNING

A battery lodged in the esophagus is a medical emergency even if asymptomatic.

Presentation can vary and be non-specific – from the completely asymptomatic patient to a clinically unstable patient.

Non-specific symptoms can include nausea, pain, coughing, fever, and tachycardia. Misdiagnosis and mistreatment can be high, therefore thorough history gathering is key.

- Urgent assessment of airway patency **must** be completed prior to any other treatment
- Do not induce vomiting
- Do not delay conveyance to nearest emergency department to administer honey

Unconscious patients should have their breathing and circulation assessed concurrently. If the patient is found to be pulseless, there is no change in patient management – compressions and defibrillation continue to be prioritized above ventilations. In the event of a pediatric cardiac arrest, emphasis must be placed on early airway management and ventilatory support.

Additional Treatment Information

With the exception of honey, patients should be given nothing by mouth until the ingestion is confirmed through radiography. Honey is administered in an attempt to coat the battery poles and delay the progression of chemical burns to the adjacent tissues.

Referral Information

There is no current referral pathway for these patients. Conveyance to an Urgent and Primary Care Centre is not appropriate.

General Information

BBI can lead to significant morbidity and mortality in the pediatric population due to the creation of a local pH environment from 10-13 leading to liquefactive necrosis at the negative pole.

There is often little out-of-hospital treatment available beyond supportive care and conveyance to the nearest emergency department.

Patients who have ingested a button battery can present with vague symptoms similar to a viral illness. Any suspicion of ingestion needs to be investigated and clinicians must maintain a high index of suspicion.

General clinical features include:

- Airway obstruction and associated drooling
- Acute Stridor
- Unexplained wheeze
- Dysphagia and cough
- Difficulty swallowing or feeding
- Decreased appetite
- Throat, chest, or abdominal pain
- Fever (usually indicates esophageal perforation)

Late Signs:

- Hematemesis
- Melena or hematochezia
- Epistaxis (unless the battery is impacted within the nares, this is likely the result of injury to the esophagus)

Interventions

First Responder

- Estimate time of BBI
- Monitor and maintain airway, breathing, and circulation
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Monitor and provide ongoing care until arrival of additional resources

Emergency Medical Responder – All FR interventions, plus:

For stable witnessed or suspected unwitnessed ingestion within 12 hours, and if there are no airway concerns and the patient's ability to swallow is intact:

- Children over 1 year old:
  - Commercial honey, when available, should be administered
    - 10 mL every 10 minutes to a maximum of 60 mL; *do not delay conveyance to find or administer honey*
  - Convey to nearest emergency department with ongoing monitoring
- Do not give honey to children under 1 year old

References

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2. BC Emergency Medicine Network. Foreign body ingestion -- diagnosis and treatment. 2021. [Link]
3. Darr et al. Recognition and management of button battery ingestion amongst emergency practitioners. 2021. [Link]
4. Leinwand et al. Button battery ingestions in children: a paradigm for management of severe pediatric foreign body ingestions. 2016. [Link]
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Practice Updates

- 2022-09-29: guideline created

K01: Infectious Diseases

Dylan Lomax and Janie Nichols

Reviewed: December 2, 2020

Introduction

Paramedics and EMRs/FRs are exposed to a wide range of infectious diseases as part of their daily work. Many of these diseases have characteristic and particular signs and symptoms, whereas others are only evident through appropriate diagnostic testing. The purpose of this clinical practice guideline is to offer general advice on preventing exposures and limiting the effect of infectious diseases on the broader health care system.

Essentials

- Paramedics and EMRs/FRs should become familiar with and regularly review the BCEHS Exposure Control Plan for information on managing infectious disease hazards. The Plan contains information on contact, droplet, and airborne precautions.
- Whenever possible, select personal protective equipment based upon diagnosed or suspected illnesses. Follow directions for donning and doffing personal protective equipment.
- Very few infectious diseases have specific clinical features that are amenable to out-of-hospital treatment. Consider the use of CPG K02: Sepsis when warranted.
- Paramedics and EMRs are encouraged to consult with CliniCall for additional guidance on these issues.

General Information

Measles

- Measles is a severe illness caused by a virus in the paramyxovirus family. It is very contagious and spreads via direct contact and through the air. Because of immunization, measles is rare in Canada, but outbreaks occur in communities where vaccination rates are low. It is endemic in some countries, particularly in South East Asia, and should be considered in the returning unvaccinated traveler with a rash, fever, and cough.
- In individuals who are not immunocompromised, measles classically features four stages: incubation; prodrome; exanthema (rash); and recovery.
  - The incubation period of measles is between six and 21 days, with a median time of 13 days
  - A two- to four-day prodromal phase is characterized by fever, malaise, anorexia, a stuffy or runny nose, and cough; if present, Koplik spots (small white spots which appear inside the mouth and throat) typically occur approximately 48 hours prior to the exanthema
  - The characteristic exanthema, or rash, develops approximately two to four day after onset of fever; it consists of a red maculopapular rash, which classically begins on the face and head and spreads downward
  - Cough may persist for one two weeks after measles; the occurrence of fever beyond the third to fourth day of rash suggests a measles-associated complication
- Staff are considered immune to measles if they:
  - Are born during or before 1957
  - Can provide evidence of 2 documented doses of measles vaccine
  - Have laboratory confirmed evidence of measles in the past
- It is important to perform a point of care risk assessment – does the patient have symptoms consistent with measles? If yes, apply airborne precautions:
  - Wear elastomeric half-face respirator (EHFR) or N95 respirator and face shield
  - Have patient cover their nose and mouth with their sleeve or tissue when coughing, sneezing, or speaking
  - Have patient wear a surgical/procedural mask
  - Wear gloves and gown if there is potential for contamination from respiratory secretions or drainage from skin blisters or lesions
  - Ensure proper ventilation in vehicles: create a negative pressure environment in the patient compartment of ambulance and set the rear exhaust fans in the patient compartment to HIGH in order to maximize air extraction
- Excellent hand hygiene must be performed, especially after gloves and other used PPE are removed.

- Provide notification to the receiving facility.
- On arrival at destination, the driver (not wearing PPE), should coordinate with hospital staff to ensure safe patient placement.
- Leave patient compartment open to ventilate for at least 20 minutes after arrival. Open doors and windows. Exhaust fans should remain on whenever possible.
- Clean and disinfect all used equipment and touched surfaces in vehicle.
- If possible, have one paramedic or EMR/FR access items required from kits and pass to the paramedic or EMR/FR providing care.
- Use a face shield with EHFR or N95 respirator, especially when working with airborne disease transmission risks. These include nebulizer therapy, suctioning, bag-valve mask ventilation, and endotracheal intubation.

Tetanus

- Tetanus is a nervous system disorder characterized by muscle spasms caused by the toxin-producing anaerobe *Clostridium tetani*. The bacteria generally enter through a break in the skin such as a cut or puncture wound by a contaminated object and produce toxins that interfere with normal muscle contractions. The term "lockjaw" (now called trismus) serves as a reminder of one of the cardinal features of tetanus – intense, painful spasms of the masseter muscles.
- Signs and symptoms of tetanus infection include:
  - Stiff jaw or neck muscles, which make it difficult to move the jaw or neck normally
  - Strange-looking smile that does not go away
  - Tight, painful muscles that do not relax
  - Difficulty breathing, swallowing, or both
  - Irritability and restlessness
  - Diaphoresis
  - Tachycardia and arrhythmias
  - Fever
  - Painful muscle spasms
- Unlike many infectious diseases, recovery from naturally acquired tetanus does not result in immunity to tetanus. Paramedics and EMRs/FRs are considered immune to tetanus if they have an up-to-date tetanus vaccination.
- In British Columbia, tetanus vaccination is offered to Grade 9 students. Prophylactic vaccination should be considered and encouraged for all wounds, including open wounds, bites, crush injuries, frostbite, burns, and corneal abrasions.
- Tetanus is not communicable from person to person.
- Most patients who develop tetanus are not completely vaccinated and do not receive adequate wound prophylaxis, even when they present for medical care. Incomplete vaccination is more likely in the following groups:
  - Injection drug users
  - Immigrants
  - Rural populations
  - Older adults

Influenza

- Influenza is an acute respiratory illness caused by influenza type A or B viruses that occurs in outbreaks and epidemics worldwide, mainly during the winter season. Signs and symptoms of upper and/or lower respiratory tract involvement are present, along with indications of systemic illness such as fever, headache, myalgia, and weakness. Although acutely debilitating, influenza is a self-limited infection in the general population (uncomplicated influenza); however, it is associated with increased morbidity and mortality in certain high-risk populations (complicated influenza).
- Influenza typically begins with the abrupt onset of fever, headache, myalgia, and malaise. These symptoms are accompanied by manifestations of respiratory tract illness, such as nonproductive cough, sore throat, and nasal discharge. Older adult patients are particularly likely to have subtle signs and symptoms. Typical findings such as sore throat, myalgias, and fever may be absent and general symptoms such as anorexia, malaise, weakness, and dizziness may predominate.
- Fever usually ranges from 37.8 to 40.0°C but can get as high as 41.1°. Fever is often higher in children than adults. Gastrointestinal illness, such as vomiting and diarrhea, are usually not part of influenza infections in adults but can occur in 10 to 20 percent of influenza infections in children.
- Each individual acquires a number of influenza infections throughout life. It is expected that up to ~15% of a European population in a temperate climate is infected with influenza in any winter season, with higher percentages in children and lower in older adults.
- Whether individuals fall ill after infection is dependent on a number of factors. These include previous exposure to a similar influenza virus that has induced a complete or partial protective immunity to the now circulating virus, or exposure through

vaccination with an updated matching influenza vaccine strain.

- Influenza virus can potentially be transmitted through:
  - Droplet exposure of mucosal surfaces (e.g., nose, mouth, and eyes) by respiratory secretions from coughing or sneezing
  - Contact, usually of hands, with an infectious patient or fomite (a surface that is contaminated with secretions) followed by self-inoculation of the virus onto mucosal surfaces such as the nose, mouth, or eyes
  - Small particle aerosols in the vicinity of the infectious individual
- Transmission of influenza through the air over longer distances, such as from one patient room to another, is not known to occur. All respiratory secretions and bodily fluids, including diarrheal stools, of patients with influenza are considered to be potentially infectious.
- The Government of Canada and Public Health Agency of Canada have provided recommendations regarding infection control measures for seasonal influenza infection in health care settings. All healthcare workers should be vaccinated against seasonal influenza annually.
- Safety measures to prevent the spread of influenza infections in health care facilities include the use of routine and droplet precautions when caring for patients with known or presumed influenza virus infection. Face masks and EHFR or N95 respirators must be used for the routine care of patients with suspected or confirmed influenza infection and especially during aerosol-generating procedures.

H1N1 Influenza

- H1N1 swine influenza type A (swine flu or pig flu) is a respiratory disease that occurs in pigs that is caused by the influenza virus. Swine influenza virus is common throughout pig populations worldwide. Transmission of the virus from pigs to humans is not common and does not always lead to human influenza, often resulting only in the production of antibodies in the blood. People with regular exposure to pigs are at increased risk of swine flu infection. The meat of an infected animal poses no risk of infection when properly cooked.
- In late March and early April 2009, an outbreak of H1N1 influenza virus was detected in Mexico, with subsequent cases observed in many other countries including the United States. In June 2009, the World Health Organization (WHO) raised its pandemic alert level to the highest level, phase 6, indicating widespread community transmission on at least two continents. The pandemic was declared to be over in August 2010.
- The signs and symptoms of influenza caused by pandemic H1N1 influenza virus were similar to those of seasonal influenza, although gastrointestinal manifestations appeared to be more common with pandemic H1N1 influenza.
- The most common clinical findings of the 2009 H1N1 influenza pandemic were fever, cough, sore throat, malaise, and headache. Vomiting and diarrhea were also common, both of which are unusual features of seasonal influenza. Other frequent findings included chills, myalgias, and arthralgias.
- The H1N1 virus that caused the 2009-2010 flu pandemic is a regular human flu virus and continues to circulate seasonally worldwide.
- 2009 H1N1 influenza virus appears to be transmitted from person to person through close contact in ways similar to other influenza viruses. Although the relative contribution of each mode is uncertain, influenza virus can potentially be transmitted through:
  - Droplet exposure of mucosal surfaces (e.g., nose, mouth, and eyes) by respiratory secretions from coughing or sneezing
  - Contact, usually of hands, with an infectious patient or fomite (a surface that is contaminated with secretions) followed by self-inoculation of the virus onto mucosal surfaces such as those of the nose, mouth, and eyes
  - Small particle aerosols in the vicinity of the infectious individual
- Transmission of influenza through the air over longer distances, such as from one patient room to another, is not known to occur. All respiratory secretions and bodily fluids, including diarrheal stools, of patients with 2009 H1N1 influenza are considered to be potentially infectious.
- The Government of Canada and Public Health Agency of Canada have provided recommendations regarding infection control measures for seasonal influenza in health care settings. All healthcare workers should be vaccinated against seasonal influenza annually.
- Precautions to prevent the spread of influenza infections in health care facilities include the use of standard and droplet precautions when caring for patients with known or suspected influenza virus infection. Face masks and EHFR or N95 respirators must be used for the routine care of patients with suspected or confirmed influenza infection and especially during aerosol-generating procedures.

Tuberculosis

- Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* (MTB) bacteria. TB generally affects the lungs, but can also affect other parts of the body. Inhalation of *Mycobacterium tuberculosis* and deposition in the lungs leads to one of four possible outcomes: immediate clearance of the organism; primary disease (rapid progression to active disease); latent infection (with or without subsequent reactivation disease); or reactivation disease (onset of active disease many years following a period of latent infection).

- The classic symptoms of active pulmonary TB are a chronic cough with blood-containing sputum, fever, night sweats, shortness of breath, and weight loss.
- Fever is usually low grade at onset but becomes marked with progression of disease.
- Cough may be absent or mild initially, but as the disease progresses the cough becomes more continuous and productive with yellow or yellow-green sputum, and occasionally blood-streaked sputum.
- Anorexia, wasting, and malaise are common features of advanced disease and may be the only presenting features in some patients.
- Bacille Calmette-Guérin (BCG) is a live strain of *Mycobacterium bovis* developed by Calmette and Guérin for use as an attenuated vaccine to prevent TB and other mycobacterial infections. BCG does not consistently prevent pulmonary infection. The magnitude of protection appears to be in the range of 80% in the first 15 years of life, but is much lower subsequently. The greatest benefit of BCG appears to be a diminished risk of TB, including meningeal TB and disseminated disease in children, and pulmonary TB in adults.
- Person-to-person transmission of TB occurs via inhalation of droplet nuclei. When people with active pulmonary TB cough, sneeze, speak, sing, or spit, they expel infectious aerosol droplets that are 0.5 to 5.0 µm in diameter. A single sneeze can release up to 40,000 droplets. Each one of these droplets may transmit the disease, since the infectious dose of TB is very small (the inhalation of fewer than 10 bacteria may cause an infection).
- It is important to perform a point of care risk assessment – does the patient have symptoms consistent with TB? If yes apply airborne precautions:
  - Wear an EHFR or N95 respirator and face shield
  - Have patient cover their nose and mouth with their sleeve or tissue when coughing, sneezing, or speaking
  - Have patient wear a surgical/procedural mask
  - Wear gloves and gown if there is any potential for contamination from respiratory secretions
  - Ensure proper ventilation in vehicles: create a negative pressure environment in the patient compartment of the ambulance and set the rear exhaust fans in the patient compartment to HIGH in order to maximize air extraction (engineering control)
- Excellent hand hygiene must be performed, especially after gloves and other used PPE are removed.

Varicella

- Chickenpox (varicella) is an infection caused by the varicella-zoster virus (VZV). Varicella is a common and highly infectious childhood disease that is found worldwide. Symptoms appear 10 to 21 days after infection and last about two weeks. The defining symptom is a characteristic blister-like rash, which can cause severe irritation. Most children have a relatively mild illness, but severe illness can occur in adults and people with depressed immunity due to existing illness or because of a treatment that they are receiving (e.g., chemotherapy).
- The first noticeable symptom is the onset of a slight fever, which is usually followed by some mild constitutional symptoms, such as a headache, runny nose, and a general feeling of malaise.
- The defining symptom of varicella is the eruption of skin lesions on all areas of the body, including on the scalp and mucous membranes of the mouth and upper respiratory tract. These fluid-filled lesions, or vesicles, occur in "crops" so that several stages of old and new lesions will be present at the same time.
- The VZV is a DNA virus that is a member of the herpes virus group. After the primary infection, VZV stays in the body (in the sensory nerve ganglia) as a latent infection. Primary infection with VZV causes varicella. Reactivation of latent infection causes herpes zoster (shingles).
- In most cases, getting chickenpox confers lifelong immunity. Multiple infections in a single individual can occur, but are rare.
- Varicella is spread through the air when an infected person sneezes or coughs. It can also be spread through contact with the fluid from varicella blisters, or the saliva of a person who has the disease. A pregnant woman with varicella can pass it on to her baby before birth.
- The US Centers for Disease Control and Prevention (CDC), the American Academy of Pediatrics, and infectious disease experts, have published guidelines or algorithms designed to aid clinicians in the control of nosocomial exposures to Varicella.
  - Patients with varicella should be placed on airborne and contact precautions. All healthcare personnel should wear an EHFR or N95 respirator when in contact with potentially infected patients, even if they are considered immune (e.g., they completed the vaccine series or have a history of the disease). This is because varicella vaccine is not 100% effective in preventing infection and providing consistent recommendations helps ensure adherence to these precautions which provide respiratory protection.
- It is important to perform a point of care risk assessment – does the patient have symptoms consistent with Varicella? If yes apply airborne precautions:
  - Wear an EHFR or N95 respirator and face shield

  - Have patient cover their nose and mouth with their sleeve or tissue when coughing, sneezing, or speaking
  - Have patient wear a surgical/procedural mask
  - Wear gloves and gown if there is the potential for contamination from respiratory secretions or drainage from skin blisters or lesions
  - Ensure proper ventilation in vehicles: create a negative pressure environment in the patient compartment of the ambulance and set the rear exhaust fans in the patient compartment to HIGH in order to maximize air extraction (engineering control)
- Excellent hand hygiene must be performed, especially after gloves and other used PPE are removed
- The CDC recommends that healthcare personnel who care for immunocompetent patients with dermatomal zoster (shingles) use routine precautions alone, without airborne and contact isolation precautions. Routine precautions entail:
  - Hand hygiene before and after contact with every patient, regardless of whether gloves are also used
  - Use of gloves, gowns, and eye protection in situations in which exposure to blood or body secretions is possible
  - Use of respiratory hygiene/cough etiquette by patients or health care workers with cough or respiratory secretions; this includes covering the nose and mouth when coughing, disposing of used tissues promptly, and practicing hand hygiene after contact with respiratory secretions
  - Use of a mask and spatial separation of patients with respiratory symptoms in waiting areas

K02: Sepsis

Richard Armour, Shauna Speers, and Jacob Hutton

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Introduction

Sepsis is a syndrome of life-threatening organ dysfunction resulting from a dysregulated host response to an infection. In Canada, 1 in 18 deaths are directly related to or complicated by sepsis, with the condition having prolonged psychosocial effects on survivors. Sepsis disproportionately affects the very young (below 1 year of age) and older adults (above 50). Paramedics and EMRs/FRs must recognize the potential for sepsis and be prepared to provide care to protect a patient’s airway, ensure adequate oxygenation and ventilation, and maintain end-organ perfusion.

Essentials

- The National Early Warning Score-2 (NEWS2) is a screening tool designed to identify patients at high risk for deterioration from all causes, including sepsis. Paramedics and EMRs should routinely obtain a NEWS2 score on all patients and use these findings to help guide management, including conveyance methods, pre-arrival notification, and in-hospital advocacy.
- Use appropriate personal protective equipment. For patients with suspected respiratory infections, paramedics and EMRs/FRs should use airborne droplet precautions.
- Patients with chronic fluid-retention (e.g., congestive heart failure or chronic renal failure) may also be fluid depleted and require fluid resuscitation. Assess for signs of volume overload continually throughout patient contact and stop infusion if edema becomes apparent.

Additional Treatment Information

- Sepsis can cause increased capillary permeability. All patients receiving fluid must be continually monitored for signs of volume overload, such as the development of pulmonary edema.
- Administration of vasopressors through peripheral IV lines carries a risk of significant extravasation injury. If vasopressors are used, they must be given through a 20G or larger IV catheter placed above the wrist. Paramedics must continually monitor for signs of extravasation; if swelling or pain around the IV site are present, the receiving facility must be notified immediately.
- Capillary blood glucose levels should be assessed in all patients with suspected sepsis. A measurement > 7.7 mmol/L, in the absence of diabetes, is suggestive of an underlying hypermetabolic state, which may be a sign of sepsis.
- Notify receiving facilities early for immunocompromised patients who are suspected of having sepsis. These patients often require isolation on arrival.

General Information

- NEWS2 relies on several physiological parameters already measured by paramedics and EMRs in their practice:
  - Respiratory rate
  - Oxygen saturation scale 1 (for patients without COPD)
  - Oxygen saturation scale 2 (for patients with COPD)
  - Systolic blood pressure
  - Pulse rate
  - Level of consciousness or new-onset confusion
  - Temperature
- Primary risk factors for sepsis include:
  - Age > 65
  - Immunosuppression
  - Diabetes
  - Obesity
  - Current diagnosis of cancer
  - Hospitalization within the preceding 90 days
- In isolation, malodorous urine is not associated with a urinary tract infection.

- Elderly individuals with sepsis frequently do not present with a fever. Patients should be asked about antipyretic medications as these may mask a fever. In all patients, the absence of fever does not exclude sepsis. Hypothermia, where it is present, is an ominous sign in sepsis.
- Paramedics and EMRs should consider the possibility of meningococcal septicemia and invasive group A streptococcus (necrotizing fasciitis).

National Early Warning Score-2

BC Emergency Health Services advocates the use of the National Early Warning Score (NEWS2) to identify patients at risk of sudden deterioration. NEWS2 scores should be obtained on all patients, and used to guide clinical decision-making, particularly in the areas of conveyance, clinical pathway selection, pre-arrival notification, ongoing monitoring, and emergency department advocacy. Note: SpO_2 Scale 1 is for patients not diagnosed with COPD; SpO_2 Scale 2 is for patients diagnosed with COPD.

Chart 1: The NEWS scoring system

Physiological parameter	Score 3	2	1	0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO_2 Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO_2 Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

Score	Clinical Risk	Practitioner Response
Aggregate score 0 - 4	Low	• Routine monitoring • Routine transport or referral pathway as required
Score of 3 in any individual parameter	Low - Medium	• Monitor carefully • Routine transport as required
Aggregate score 5 - 6	Medium	• Monitor carefully • Attempt to optimize oxygenation, ventilation, and perfusion • Consider advanced care intercept where available • Consider emergency transport to hospital • Consider pre-arrival notification • Consider CliniCall consultation
Aggregate score ≥7	High	• Monitor continuously • Maximize oxygenation, ventilation, and perfusion • Seek advanced care intercept, but do not delay transport in doing so • Emergent transport to hospital • Pre-arrival notification

NEWS2 is not intended to replace sound clinical judgment. Its purpose is to alert practitioners to the risk of sudden deterioration and to help identify those patients who require more aggressive monitoring, treatment, and advocacy. NEWS2 is particularly valuable in the context of infectious diseases and suspected sepsis.

Interventions

First Responder

- Position supine to improve blood pressure if not in respiratory distress
- Do not walk the patient
- Supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Obtain and document NEWS2 score
- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Perform full-body assessment to examine for presence of mottling or non-blanching rash; consider meningococcal septicemia

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypotension or hypoperfusion
  - → D03: Vascular Access
- Consider CPAP if necessary to support oxygenation in cases of respiratory infection

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Concurrent use of vasopressors and fluid resuscitation is patient specific
  - CliniCall consultation recommended to discuss care planning options.
- KetAMINE is the preferred induction agent if advanced airway management is required to maintain airway patency, oxygenation, or ventilation
  - → PR18: Anesthesia Induction

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Hemodynamic support (maintain MAP > 65)
- Consider radial arterial line placement
- Consider femoral arterial line placement
  - Consider norepinephrine
  - Consider Vasopressin
  - Consider Phenylephrine
  - Consider Epinephrine
  - Consider Dobutamine ($ScVO_2 \geq 65$)
- Ultrasound and IVCDI to determine fluid responsiveness
  - Passive leg raise test
  - Use a balanced crystalloid rather than saline
  - goal of urine output of 50 ml/hr or 0.5ml/kg/hr
- Consider blood products (pRBC)
  - Call ETP prior to blood products
  - Hgb > 70
- Consider adrenal insufficiency
- Respiratory support
  - Consider NIPPV
  - Consider IPPV
    - Consider a recruitment maneuver
    - Consider prone ventilation
    - ARDSnet protocol
  - Consider ABG/VBG analysis to guide therapy.
- Consider appropriate antimicrobial coverage
  - Call ETP prior to antimicrobial coverage
  - Gram positive
  - Gram negative
  - Atypical coverage
  - Antiviral
  - Antifungal

Evidence Based Practice

Septic Shock

Supportive

- Liberal fluid management
- Pressors
- Titrated fluid management
- Balanced crystalloids

Neutral

- Colloid Infusion
- Trendelenburg
- Crystalloid Infusion

Against

Sepsis Syndrome

Supportive

- Identification tools (other)
- Identification tools- qSOFA
- Identification tools-SIRS
- Oxygen-titrated
- Point of Care Lactate
- Prenotification
- Temperature Monitoring

Neutral

- Early Goal Directed Therapy
- Prehospital Antibiotics

Against

- Oxygen-high flow

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K03: Influenza-Like Illness (Covid-19)

Clinical Medical Programs

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Introduction

The role of paramedics and emergency medical responders around the world is shifting away from conveying all patients and moving towards an "Assess, See, Treat, and Refer" (ASTAR) model for appropriate 911 calls. The BCEHS Influenza-Like Illness (ILI) clinical practice guidelines supports paramedics in identifying patients who may be suitable for continued care within the patient's own home, using a combination of thorough assessment, shared decision-making, and appropriate safeguarding measures.

Essentials

- Patients with ILI/COVID MAY be eligible for care within their own home if they are between the **ages of 17 and 60,** have **no 'red flag' symptoms**, **no single NEWS2 score of 3,** and have a **total NEWS2 score of 3 or less**.
- The ASTAR approach to care does not replace paramedic clinical judgement and conveyance should still be provided if there are reasonable concerns or doubts about the nature of the patient's condition, patient or caregiver ability to seek further assistance, or any other elements of concern to the paramedic.
- **Consultation with CliniCall is an essential component of this ILI/Covid Clinical Pathway** to ensure appropriate safeguarding and follow-up, as required (see referral information below).

Additional Treatment Information

- Where patients do not have access to simple analgesics such as acetaminophen, it may be appropriate for paramedics to provide a single dose on scene prior to discharge from care.
- A NEWS2 score MUST be recorded on the ePCR to support the clinical decision making process employed during patient care.
- The patient, or their substitute decision maker, must display competency and capacity to provide informed consent and to be eligible for inclusion in the ILI Clinical Pathway.

Referral Information

- ILI Clinical Pathway is for use by PCP, ACP and CCP

Low Risk	Medium Risk	High Risk
NEWS2 Score of equal to 3 or less in total and **no single NEWS2 score of 3**	NEWS2 score between 4-6	Total equal to 7 or more
Suitable for clinical pathway consideration	Convey to Emergency Department	Convey to Emergency Department with Hot Response

- Patients who paramedics deem eligible for inclusion in the ILI Clinical Pathway MUST be referred through the CliniCall service
  - CliniCall consultation required prior to utilizing the ILI Clinical Pathway.

General Information

- Use BCCDC screening tool as part of initial assessment.
- Red-flag concerns in all ILI patients may include:
  - Severe dyspnea at rest
  - On-going dyspnea
  - Dyspnea on exertion
  - Pain or pressure in the chest
  - Cold, clammy, pale, or mottled skin
  - New onset confusion
  - Altered mental status
  - Cyanosis
  - Hemoptysis

  - Little to no urine output
  - Neck stiffness
  - Non-blanching rash
- A systems-based assessment should be recorded within the ePCR, including a review of systems (ROS: nervous; respiratory; cardiovascular; gastrointestinal; genitourinary; musculoskeletal; integumentary; and immune systems).
- Patients and/or caregivers should be provided with sufficient discharge advice to be able to identify potential deterioration in their status and act accordingly. This must be documented in the care planning section of the ePCR.

Interventions

First Responder

- Unable to practice with clinical guideline or Clinical Pathway

Emergency Medical Responder – All FR interventions, plus:

- Unable to practice with clinical guideline or Clinical Pathway

Primary Care Paramedic – All FR and EMR interventions, plus:

- Acetaminophen

L01: Maternity (General)

Catherine Malette and Alex Kuzmin

Updated: May 25, 2021
Reviewed: March 01, 2021

Introduction

Pregnancy is the process of human growth and development while in utero. It is often identified a few weeks after conception and lasts on average 37 to 40 weeks, which is considered full-term. The process is divided into 3 trimesters - the first trimester ranges from week one to week 12, the second trimester ranges from week 13 to week 28, and the third trimester ranges from week 29 to week 40+. Patients may present with various complaints at any point along the course of the pregnancy.

Essentials

- Pregnancy is a natural process and should be treated as such by health care providers as long as the patient and the unborn child remain stable and have been identified as low risk.
- Labour and delivery:
  - Labour consists of 3 stages:
    - 1st stage: Dilation of cervix by regular and painful contractions; this stage may last up to 12 hours
    - 2nd stage: Birth of the infant; this stage may last between 2 and 3 hours, but can also be much shorter in subsequent deliveries
    - 3rd stage: Delivery of the placenta; this stage may last up to 1 hour
  - Imminent delivery:
    - → L02: Normal Labour
  - Trauma in pregnancy:
    - → L10: Pregnancy and Trauma

Additional Treatment Information

- When conveying a pregnant patient, particularly during the third trimester, the patient should be positioned appropriately to avoid compression of the inferior vena cava by the uterus, which can compromise venous return and cardiac output. This can be accomplished through left-lateral positioning, the use of a hip wedge or board, or manual uterine displacement. This positioning is unnecessary during delivery, when the patient can be placed supine.
  - If the patient requires spinal motion restriction, they can be packaged and tilted to 15° as an entire unit
- Multiple clinical and non-clinical factors must be considered in deciding whether to convey or attempt delivery on scene, including high or low risk delivery, the environment for delivery, conveyance time to next level of care, and road and weather conditions. If providing conveyance and delivery becomes imminent, stop the ambulance if and when safe to do so.

Referral Information

- All stable pregnant patients should be referred to their primary care provider and may choose to stay at home.
- Any unstable pregnant patients, or presenting with concerning signs and symptoms such as vaginal bleeding at any point during the pregnancy, should be conveyed to the emergency department regardless of the gestational age of the embryo or fetus.
- Collaboration between midwives and paramedics or EMRs/FRs:
  - Registered British Columbia midwives can be the primary care provider during maternity and delivery calls; their scope of practice with respect to neonatal resuscitation exceed those of ACP providers
  - Responsibility for maternal resuscitation remains with paramedics; midwives do, however, have an expanded scope of practice for medications
  - Patients under the care of a midwife may refuse conveyance to a hospital prior to or following a delivery; this is a discussion to have with all parties present with the goal of patient and family centred decisions and care, while keeping in mind the health of the mother and neonate

General Information

- Definitions of note:

  - Term: 37 - 40 weeks gestation
  - Pre-term: 24 - 36 weeks gestation
  - Show: vaginal discharge of mucus and blood (i.e. mucus plug)
  - Spontaneous rupture of membranes: outpouring of normally clear or pinkish fluid; can occur from prior to onset of labour until baby is born
  - Meconium-stained amniotic fluid: greenish or brown stained amniotic fluid visible in ruptured membranes
  - Imminent birth presentation: active pushing or grunting; rectal pressure (e.g., urge to use bowels or bladder); anal pouting or bulging perineum; strong unstoppable urge to push; presenting part on view or crowning; or patients stating, "I'm going to have the baby," or "It's coming now"
  - Precipitous birth: unusually rapid labour, less than four hours long with extremely quick birth; the rapid change in pressure from intrauterine life may cause cerebral irritation
- Patients who are pregnant experience a number of physiological changes. Of relevance to paramedics and EMRs:
  - Cardiovascular
    - Blood pressure experiences minimal changes, though there is an initial decrease in the first and second trimesters with a return to baseline in the third; systolic blood pressures above 160 mmHg and diastolic pressures greater than 110 mmHg are considered significant
    - Heart rate elevates by 15-20 beats per minute; normal heart rate in pregnancy is 80-110 beats per minute
    - Cardiac output increases by 30-40% to a normal volume of 6-7 L per minute during pregnancy
    - Non-specific ST segment changes are sometimes seen on ECG, along with Q waves in leads III and aVF and atrial and ventricular ectopic beats
    - Systemic vascular resistance often decreases due to the effects of progesterone
  - Respiratory
    - Respiratory rate increases by 15% (2-3 breaths/minute)
    - Oxygen demand increases by 15-20%
    - Tidal volume and minute ventilation increase by 25-50%
    - Arterial pH rises to 7.40-7.45
    - PaO_2 increases by 10 mmHg
    - $PaCO_2$ decreases to 27-32 mmHg
  - Hematological
    - Blood volume increases by 30-50%
    - Hemoglobin falls to 100-140 g/L
    - Hematocrit falls to 32-42, producing physiological anemia
    - Plasma volume increases by 30-50%
  - Health care providers often use the acronym GTPAL to assess pregnant women:
    - G - Gravida: number of previous pregnancies
    - T - Term: number of infants born between 37 and 40 weeks gestation
    - P - Pre-term: number of infants born before 37 weeks gestation
    - A - Abortions: number of abortions (spontaneous or therapeutic)
    - L - Living: number of living children
  - A focused maternal history, in addition to routine history and examination, is essential on every maternity or delivery call and includes the following information:
    - Current pregnancy:
      - Current gestational age?
      - Multiple births expected?
      - Membranes ruptured or intact? If ruptured, colour of amniotic fluid?
      - Is the patient currently having contractions? Assess duration, intensity, and frequency.
      - Does the patient have an uncontrollable urge to push?
      - Has the patient felt fetal movements? If so, when were the last?
      - What hospital interventions, if any, have been performed?
      - Are there any anticipated problems or complications?
      - Has the patient had any prenatal care?
      - Any current complaints? Vaginal bleeding, hypertension, pain, trauma, etc.

- Previous pregnancies:
  - Any/number of previous pregnancies?
  - Prior caesarean sections/interventions?
  - Complications/problems with previous pregnancies?
  - Length of previous labours?

Interventions

First Responder

- Place patient in position of comfort, attempting to reduce pressure on the inferior vena cava
- Keep patient warm and prevent heat loss
- Communicate situation to follow-on responders

Emergency Medical Responder – All FR interventions, plus:

- Detailed assessment of the patient, which includes a detailed history of the current and all previous pregnancies
- Convey the patient in the left lateral position whenever possible to reduce pressure on the inferior vena cava, or in a position of comfort
- Consider analgesia:
  - Nitrous oxide
- Consider request for additional resources
- Prepare for delivery and potential neonatal resuscitation

Evidence Based Practice

Perinatal Mother Care

Supportive

Neutral

- Oxygen

Against

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L02: Normal Labour and Delivery

Catherine Malette and Matthew Smith

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Introduction

In the out-of-hospital realm, childbirth is defined as the unplanned delivery of a newborn outside of a hospital, which may or may not require resuscitation. "Imminent delivery" is defined as the moment when the head, buttocks, or legs, of the baby become visible at the vaginal opening between contractions. This is also known as crowning and signals that delivery will occur within minutes.

Childbirth is a natural process and only a small number of cases will require aggressive intervention. The successful transition from intrauterine to extrauterine life depends on significant physiological changes that occur at birth, and although most newborns make this transition successfully, a small but significant number will require additional support, including resuscitation. Paramedics and EMRs/FRs must, therefore, prepare for the case where acute care and intervention are required. It is critical to remember that maternity cases involve at least two patients and both require assessment.

Essentials

- Labour consists of 3 stages:
  - 1st stage: Dilation of cervix by regular and painful contractions. This stage may last up to 12 hours.
  - 2nd stage: Birth of the neonate. This stage may last between 2 and 3 hours, but can also be much shorter in subsequent deliveries.
  - 3rd stage: Delivery of the placenta. This stage may last up to 1 hour.
- Signs of imminent and inevitable delivery include the following:
  - Delivery is imminent when contractions are less than 2 minutes apart and very strong.
  - Delivery is inevitable if the perineum is bulging, the head is crowning, or the patient complains of an urge to "push", "bear down", or "have a bowel movement".
- Uncomplicated/normal birth:
  - See Adult Childbirth - Imminent Delivery Algorithm in Additional Treatment section
  - The uncomplicated delivery:
    - Term gestation with a breathing and crying neonate exhibiting good tone.
    - Neonate stays with mother, skin to skin, continued observation, and maintain warmth.
  - Complicated/high risk birth:
    - → L08: Complications of Delivery (e.g., malpresentation, shoulder dystocia, cord prolapse)
    - → L07: Preterm Labour
    - → L09: Postpartum Hemorrhage
- Multiparity: Ensure that sufficient resources are assigned to each patient. Note that multiparity (twins, triplets, etc) often deliver preterm. Review CPG L07: Preterm Labour for additional information.
- Cord clamping: It is now accepted and preferred practice to delay cord clamping at least 2 minutes or longer. The practice is appropriate for healthy vigorous infants without birth complications. If resuscitation is required, the cord should be clamped immediately to facilitate the care of the neonate.
- In the event that neonatal resuscitation is required, follow the NRP principles.

Additional Treatment Information

- Patient assessment considerations:
  - Consider known malpresentation of fetus (e.g., breech)
  - Consider seeking consultation and additional resources as necessary
- General principles for active management of delivery:
  - Delivery should be controlled so as to allow a slow, controlled delivery of the neonate
  - Support the neonate's head as required
  - Check if the umbilical cord is around the neck; if it is, slip the cord over the head; if unable to free the cord from the neck,

double clamp the cord and cut between the clamps
  - Carefully hold the head with hands over the ears and lightly pull down to allow delivery of the anterior shoulder
  - Gently pull up on the head to allow delivery of the posterior shoulder
  - Slowly deliver the remainder of the infant
  - If the neonate does not require resus, pass to mother for skin-to-skin contact; apply touque to neonate
  - Instruct mother to encourage breastfeeding of neonate
  - Clamp and cut umbilical cord after approximately 2 minutes; apply first clamp 10 centimetres from the neonate and second clamp 5 centimetres after the first; cut the cord between the clamps (if the mother's partner is available and the situation permits, offer for them to cut the cord)
  - Calculate and record APGAR scores at 1 and 5 minutes
- Refer to NRP guidelines for neonatal assessment and resuscitation. See CPG M09: Neonatal Resuscitation for additional details.
- General principles for care of the mother:
  - The placenta will deliver spontaneously, usually within 30-60 minutes of the infant; do not force the placenta to deliver
  - Massaging the fundus may decrease bleeding by facilitating uterine contractions; this should be performed AFTER delivery of the placenta
  - Consider tranexamic acid in uncontrolled vaginal bleeding
  - Consider manual in utero pressure and packing
  - Midwives may give oxytocin or misoprostol for uncontrolled postpartum bleeding due to uterine atony

Referral Information

- All patients in labour should be conveyed to the nearest hospital unless delivery is imminent or the patient's primary care provider (i.e., midwife) is advising otherwise.
- Patients under the care of a midwife may refuse conveyance to a hospital following delivery. This is a discussion to have alongside all parties present with a goal of family centred decisions and care.

General Information

- The APGAR score is the tool most commonly used to assess neonates. The APGAR should be performed at 1 and 5 minutes of life.

Interventions

First Responder

- Provide position of comfort
- Keep patient warm and prevent heat loss
- If the decision is made to deliver in the field:
  - Assemble equipment, including a resuscitation area
  - Warm the environment, including towels and blankets if able; this should result in the room or space being uncomfortably warm
  - Position the patient:
    - Supine
    - Sims (lateral with knees to chest)
    - Alternate: will vary based on situation and what the patient desires
  - Delivery of the neonate (second stage):
    - Allow the patient to push in coordination with contractions until crowning at of the vaginal opening appears - note that paramedics and EMRs are not trained to do internal vaginal exams to determine if the patient is fully dilated and effaced
    - Control the delivery of the head by applying gentle pressure with the palm of your hand onto the fetal head and perineum; feel for nuchal cord
      - If nuchal cord present, gently lift it over the infant's head; DO NOT pull hard on the cord as avulsion can occur, gentle traction is acceptable
      - Clamping and cutting the cord may be necessary if it cannot be reduced; delivery must be completed quickly if the

cord is cut

- Support the neonate's head and guide the delivery of the shoulders; gentle downward pressure towards the floor will assist the delivery of the anterior shoulder
  - After the anterior shoulder is delivered, direct the head upwards to help deliver the posterior shoulder
  - If shoulder dystocia is suspected, see →L08: Complications of Delivery

Post-delivery care of the neonate:

- Once the neonate is delivered: clear mouth then nose of secretions only if grossly contaminated; dry; stimulate; and reposition while ensuring warmth is maintained
- Place the infant on the mother's chest; apply touque to neonate
- Instruct mother to encourage breastfeeding of neonate
- The use of a food grade polyethylene plastic bag to place the neonate in has become an effective method to prevent hypothermia in both term and preterm neonates; cover the neonate up to the shoulders and do not secure the bag in any way around the neck
- Cord clamping:
  - Should be delayed at least 2 minutes in term and preterm vigorous infants
  - Place first clamp 10 centimeters from neonate and second clamp 5 centimeters after first; cut in between the clamps (if the mother's partner is available and the situation permits, offer for them to cut the cord)

Emergency Medical Responder – All FR interventions, plus:

- Consider inhalational analgesia
  - → E08: Pain Management
  - → Nitrous Oxide
- Routine suctioning of the mouth and nose is no longer recommended
  - If necessary, a 6 Fr catheter can be used; suction should be turned down to less than 100 mmHg
- Convey in a warm ambulance with the ambient temperature at 22 to 26 degrees Celsius
- Assess the infant:
  - APGAR at 1 and 5 minutes of life (see APGAR link in General Information section)
  - Normal vital signs for a newborn:
    - Temperature target is between 36.1°C and 37°C axillary
    - Heart rate - 120-160 beats per minute (can be palpated at the base of the umbilical cord or by auscultation)
    - Respiratory rate - 35-60 breaths per minute (should be counted over a full minute)
    - SpO_2: Target pre-ductal (right hand) SpO_2 after birth:
      - 1 minute: 60-65%
      - 2 minutes: 65-70%
      - 3 minutes: 70-75%
      - 4 minutes: 75-80%
      - 5 minutes: 80-85%
      - 10 minutes: 85-95%
    - Blood pressure can be measured using a neonatal-size blood pressure cuff in neonates with suspected cardiovascular or renal abnormalities, but is rarely performed on low risk infants
    - Blood glucose level - in healthy term neonates, routine blood glucose screening is not indicated
  - Delivery of the placenta (third stage):
    - The placenta should naturally deliver on its own within 30-60 minutes; manipulation is not authorized
    - If delivered, the placenta and cord should be conveyed along with mother and neonate
    - Up to 500 mL of blood loss from mother is normal with childbirth; anything in excess of that amount, refer to L09 Postpartum hemorrhage
    - Palpate for contracted fundus; consider performing fundal massage

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider IV access as appropriate
  - → D03: Vascular Access

- Consider antifibrinolytic therapy (tranexamic acid) for postpartum hemorrhage
  - → L09: Postpartum Hemorrhage
  - → Tranexamic Acid
  - ClinCall consultation required prior to administration of tranexamic acid.
  - Neonates at risk of hypoglycemia (< 2.6 mmol/L) should have a sample obtained within 4-6 hours and neonates with diabetic mothers < 1 hour
  - Breastfeeding is first line treatment if the neonate is able to latch and suckle

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider IO access when appropriate
  - → PR12: Intraosseous Cannulation
- Consider pain management
  - → E08: Pain Management
- Routine early tracheal intubation and suctioning in the presence of meconium with baby that is not vigorous is no longer recommended

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Active management of the third stage of labour:
  - Oxytocin as soon as the infant’s anterior shoulder is delivered
  - Uterine/fundal massage
  - Gentle traction on umbilical cord
- Umbilical cord access
- Airway intervention
- Drug therapy:
  - Uterotonic agent
  - Blood products

Evidence Based Practice

Childbirth

Supportive

Neutral

- Trach. Suctioning via ETI

Against

Childbirth/Post Natal Mother Care

Supportive

- Syntocinon

Neutral

- Uterine Massage

Against

Childbirth

Supportive

Neutral

Against

References

1. Fernandes CJ. Neonatal resuscitation in the delivery room. In UpToDate. 2020. [Link]
2. McKee-Garrett TM. Overview of the routine management of the healthy newborn infant. In UpToDate. 2020. [Link]

L03: Eclampsia

Alex Kuzmin

Updated: June 02, 2021
Reviewed: March 01, 2021

Introduction

Eclampsia is defined as a new onset seizure or coma in a woman with preeclampsia. It is a common cause of maternal and fetal morbidity and mortality. Eclamptic seizures are the result of hypertension in preeclampsia, although the precise mechanism is not well understood.

Essentials

- Risk factors for eclampsia are related to those for preeclampsia. The most common signs and symptoms are hypertension, headache, visual disturbances, and right upper quadrant or epigastric pain. However, 25% of affected patients are asymptomatic.
- Seizures due to eclampsia are commonly associated with an abrupt loss of consciousness. The seizure generally lasts for a few minutes, followed by a gradual return of consciousness over the following 10-20 minutes. Fetal bradycardia is common after a maternal seizure.
- In patients under 20 weeks gestation, eclampsia and preeclampsia are rare; other causes of seizures should be investigated. Consider anatomic abnormalities of cerebral origin in women with persistent neurological deficits. Rule out toxins, infection, and electrolyte disturbances.
- Magnesium sulfate is given to prevent a recurrence of seizures rather than to control the initial episode.
- Delivery is the definitive treatment for eclampsia.

Additional Treatment Information

- Initial assessment should focus on airway protection with adequate oxygenation and ventilation. Position the patient into a left lateral decubitus position and provide high flow supplemental oxygen.
- Convey urgently to the nearest hospital. Consider bypass to a hospital with caesarean section capabilities.

General Information

While the pathophysiology of seizures in eclampsia is not well understood, it is believed to result from vasogenic or cytotoxic edema and endothelial dysfunction secondary to abnormal cerebral autoregulation. This results in cerebral hyper- or hypoperfusion stemming from the hypertension.

Interventions

First Responder

- Maintain adequate oxygenation
  - → A07: Oxygen Administration
  - → B01: Airway Management

Emergency Medical Responder – All FR interventions, plus:

- Convey the patient in left lateral position to minimize compression of the inferior vena cava
- Obtain capillary blood glucose measurement
- Convey urgently to nearest hospital; consider conveyance to facility with OB/GYN services if not significantly further
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider obtaining vascular access
  - → D03: Vascular Access

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- ClinCall consultation recommended to discuss care planning options.
- Magnesium sulfate is the first line treatment for eclampsia
  - Cardiac monitoring is required with magnesium administration
  - Administer the initial dose of 4 to 6 g intravenously over 20 minutes as a loading dose, followed by 1 to 2 g per hour; otherwise, 5 g can be given intramuscularly (use bilateral buttocks) followed by 5 g IM every four hours
  - If seizures persist following the loading dose of magnesium, up to 4 g IV can be given over five minutes
  - During long conveyances, check respiratory rate, patellar reflexes, and where possible, urine output; discontinue magnesium if patellar reflex is absent, if respiratory rate falls below 12/minute, or muscle weakness, slurred speech, arrhythmias, or CNS depression develops
  - Consider calcium chloride for magnesium sulfate overdose if hemodynamic or respiratory instability develops
  - Myasthenia gravis is a contraindication for magnesium sulfate as it can lead to a severe myasthenic crisis
- If the patient is still seizing after 20 minutes, consider MIDAZOLam and other possible causes of seizures
  - MIDAZOLam crosses the placental barrier and may cause adverse effects on the fetus; however, prolonged seizure activity is life threatening to both the patient and the fetus - MIDAZOLam should remain an option for seizure control in these cases

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- If seizures persist following magnesium administration:
  - Call ETP prior to antiepileptic
  - Consider phenytoin IV, 1250 mg IV at a rate of 50 mg/min
- Consider antihypertensive to bring diastolic pressure below 110 mmHg and systolic pressure below 160 mmHg:
  - Call ETP prior to antihypertensive
  - Labetalol: 20 mg IV over 2 minutes followed by infusion at 1-2 mg/min
    - Maximum dose of 300 mg; monitor for hypotension and bradycardia; if bradycardia develops but blood pressure remains high, change to hydralazine
  - Hydralazine: 5 mg IV over 1-2 minutes followed by 5-10 mg IV every 20 minutes until target blood pressure is reached
    - Maximum dose of 20 mg

Evidence Based Practice

Pre Eclampsia/Eclampsia

Supportive

Neutral

Against

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Demir BC, et al. Comparison of magnesium sulfate and mannitol in treatment of eclamptic women with posterior reversible encephalopathy syndrome. 2012. [Link]
3. Marra A, et al. Posterior reversible encephalopathy syndrome: The endothelial hypotheses. 2014. [Link]
4. Norwitz ER. Eclampsia. In UpToDate. 2020. [Link]

L04: Preeclampsia

Alex Kuzmin

Updated: June 02, 2021
Reviewed: March 01, 2021

Introduction

Preeclampsia is a multisystem disorder of pregnancy over 20 weeks of gestation that presents with a new onset of hypertension and proteinuria. Hypertension in women less than 20 weeks gestation is considered pre-existing. Preeclampsia is diagnosed when the systolic blood pressure is greater than 140 mmHg, or the diastolic blood pressure greater than 90 mmHg, on at least two occasions, at least four hours apart, and accompanied with proteinuria. A systolic blood pressure above 160 mmHg, or a diastolic above 110 mmHg, is considered a severe finding.

There are multiple risk factors for preeclampsia, including prior family or personal history, age over 40 or below 18, chronic hypertension, obesity, diabetes, multifetal gestation, and renal, autoimmune, or vascular disease.

Essentials

- Hypertension in preeclampsia is caused by placental and maternal vascular dysfunction.
- Preeclampsia is associated with increased fetal and maternal morbidity and mortality.
- Delivery is the definitive treatment.

Additional Treatment Information

- Preeclampsia is an evolving disease with no effective medical treatment other than delivery of the neonate and placenta. Magnesium may provide prophylaxis against seizures. Women with severe features of preeclampsia are usually delivered promptly to prevent maternal and fetal complications.
- The administration of fluid must be done conservatively due to the risk of pulmonary edema.

Referral Information

Pregnant patients who are hypertensive should be preferentially conveyed to an emergency department associated with a labour and delivery unit. The closest emergency department may, however, be preferred if the patient requires initial resuscitation. Clinical pathway decisions should be made with the overall clinical picture in mind and in consultation with CliniCall where any doubt exists (1-833-829-4099).

General Information

- Preeclampsia is the result of microangiopathy (microvascular disease) of the brain, liver, kidney, and placenta. It can lead to pulmonary edema, liver or kidney failure, and cerebral hemorrhage. Early signs and symptoms may include headache, epigastric pain, thrombocytopenia, abnormal liver function, and visual disturbances.
- Though the exact initial cause of preeclampsia is unclear, it is provoked by a placental vascular abnormality, which results in relative placental hypoperfusion. The placental hypoxia results in an alteration of maternal systemic endothelial function; the end result is hypertension and its downstream effects.
- HELLP syndrome is a form of preeclampsia where patients experience hemolysis, elevated liver enzymes, and low platelets.
- Paramedics and EMRs should consider bypassing the closest hospital in favour of a facility with advanced obstetrical facilities. CliniCall consultation is strongly recommended.

Interventions

First Responder

- Provide position of comfort for patient
- Keep patient warm and prevent heat loss
- Provide airway management and oxygenation as required
  - → A07: Oxygen Administration

- → B01: Airway Management

Emergency Medical Responder – All FR interventions, plus:

- Convey patient in left lateral position to minimize compression of the inferior vena cava
- Treat as eclampsia if any seizures are present
  - → L03: Eclampsia
- Convey to an emergency department with OB/GYN capabilities if conveyance time does not differ significantly and the patient does not require immediate intervention or resuscitation
  - CliniCall consultation recommended if uncertain.

Primary Care Paramedic – All FR and EMR interventions, plus:

- If patient requires IV fluids:
  - → D03: Vascular Access
  - CliniCall consultation recommended to discuss care planning options due to risk of pulmonary edema and potential delay in conveyance.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider magnesium sulfate for seizure prophylaxis
  - CliniCall consultation required prior to administration of seizure prophylaxis.
  - See L03: Eclampsia for further dosing guidance

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider betamethasone for lung maturation
  - Call ETP prior to betamethasone administration

Evidence Based Practice

Pre Eclampsia/Eclampsia

Supportive

Neutral

Against

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Lain KY, et al. Contemporary concepts of the pathogenesis and management of preeclampsia. 2002. [Link]
3. Norwitz ER. Eclampsia. In UpToDate. 2020. [Link]

L05: Maternal Vaginal Bleeding (< 20 Weeks)

Catherine Malette, Alex Kuzmin, and Matthew Smith

Updated: June 10, 2021
Reviewed: March 01, 2021

Introduction

Vaginal bleeding is common in the first trimester (0 to 13+6 weeks), occurring in 20 to 40% of pregnant women. It may be any combination of light or heavy, intermittent or constant, painless or painful. The five major sources of non-traumatic bleeding in early pregnancy are: ectopic pregnancy; early pregnancy loss; implantation of the pregnancy; threatened abortion; and cervical, vaginal, or uterine pathologies (e.g., polyps, inflammation/infection, gestational trophoblastic disease).

An ectopic pregnancy is an extrauterine pregnancy most commonly presenting with at least one missed menstrual cycle, vaginal bleeding, nausea, abdominal pain, and/or pre-syncopal symptoms.

A ruptured ectopic pregnancy occurs at 6 to 10 weeks gestation and presents with severe or persistent abdominal pain associated with syncope, hypotension, shoulder tip pain (Kehr's sign), rebound tenderness, or guarding.

Miscarriage, also called a spontaneous abortion or early pregnancy loss, is defined as a non-viable intrauterine pregnancy up to 20 weeks gestation. The majority of miscarriages occur in the first trimester. Spontaneous abortions are common but a distressing complication of pregnancy. Common signs and symptoms associated with the condition are abdominal pain or cramping and vaginal bleeding.

Essentials

- All patients with suspected ectopic pregnancy must be conveyed to hospital, regardless of the severity of their presentation or response to management.
- Patients experiencing potential spontaneous abortions may present with the following signs:
  - Abdominal or pelvic pain/cramping. Pain may radiate to lower back, buttocks, or genitals.
  - Vaginal bleeding may be present and can range from spotting to life threatening hemorrhage. Depending on gestation and the nature of the miscarriage, the patient may pass the product of conception.
- Rapid conveyance of unstable patients to surgically capable ED is essential.
- Any woman of childbearing age with any of the following symptoms should be considered as presenting with a ruptured ectopic pregnancy until proven otherwise:
  - abdominal pain
  - vaginal bleeding
  - shock or syncope
- Unstable patients should be managed in accordance with CPG D01: Shock.

Additional Treatment Information

- Antifibrinolytic treatment may be considered in cases of severe, ongoing bleeding with evidence of hemodynamic compromise and long transport times. Consultation with CliniCall is required for care planning.
- Consider analgesia and antiemetics.
- Consider using abdominal pads to estimate blood loss en route to ED.
- There is no diagnostic procedure or specific management of miscarriage in the out-of-hospital environment. Management should focus on emotional support of the patient and treatment of symptoms such as pain and nausea. Paramedics and EMRs/FRs should always keep a high index of suspicion for life threatening complications, such as major hemorrhage or ectopic pregnancy.

Referral Information

All patients with suspected ectopic pregnancy or spontaneous abortion must be conveyed to the closest and most appropriate facility, regardless of the severity of their presentation or response to management.

General Information

- Ectopic pregnancies occur in 1-2% of all pregnancies and are caused by the developing embryo implanting outside the uterus. The vast majority (over 98%) of ectopic pregnancies are located within the fallopian tubes. Worldwide, the incidence of ectopic pregnancy is rising; this has been attributed to a variety of risk factors, including:
  - In vitro fertilization and fertility treatments
  - Sexually transmitted illnesses (e.g., chlamydia and gonorrhea)
  - Pelvic inflammatory disease
  - Use of intrauterine devices
  - Advanced maternal age
  - Tubal damage from previous surgeries
  - Endometriosis
- Bleeding in pregnancy should be evaluated based on gestational age of the fetus and the characteristics of the bleeding (light vs. heavy, painful vs. painless, intermittent vs. constant).
- Patients may pass products of conception which can range in nature from blood clots to a recognizable fetus. In the event of preterm labour in the second trimester, delivery may proceed spontaneously. The fetus may initially make small movements or gasp. While an infant delivered at greater than 20 weeks gestation must be registered as a birth from a legal perspective, there is no prospect for successful resuscitation prior to 23 weeks gestation. It is reasonable for paramedics and EMRs/FRs to withhold resuscitation; this decision should be explained to the patient in a sensitive way.
- Regardless of appearance or gestation, the fetus may be important to the patient. Do not dispose of the fetus. Treat the fetus respectfully in accordance with the patient's wishes. If necessary, clamp and cut the umbilical cord. Paramedics and EMRs/FRs should wrap the fetus and convey it with the patient. Products of conception are generally sent to pathology for further examination. The patient or other family members may wish to hold the fetus. This should be supported as the patient or other family members often feel comforted by the fact that the fetus was held after the dying process.
- Many women experience a strong sense of loss, sadness, anger, disbelief, disappointment, sense of isolation, and often guilt. It is normal to experience a range of feelings. Paramedics and EMRs/FRs should acknowledge the impact of the miscarriage with compassion and understanding. Minimizing the loss of the pregnancy can significantly worsen the patient's experience.

Interventions

First Responder

- Provide position of comfort for patient
- Keep patient warm and prevent heat loss
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen as required to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Convey with early hospital notification
- Consider analgesia as required:
  - → E08: Pain Management
    - Nitrous oxide

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypoperfusion or hypovolemia if SBP < 90 mmHg
  - → D03: Vascular Access
  - Consider 2 large bore IVs, initiated while en route
  - Provide warm IV fluids if possible

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Advanced diagnostics if in remote ER setting: (e.g:β-hCG, ultrasound, CBC, lactate)
- Blood products
  - Call ETP prior to blood product administration

- Reverse anticoagulants
  - Call ETP prior to reversal agent
- Consider OR/Surgery by local GP to temporize if OB/GYN not available

Evidence Based Practice

Abdominal Pain

Supportive

- Analgesia (narcotic)
- Fentanyl
- Ketamine
- Analgesia (NSAIDs)
- Nitrous Oxide

Neutral

Against

Hemorrhagic Shock

Supportive

- Plasma infusion
- Restricted Crystalloids
- Tranexamic Acid
- Mechanical Intraosseous Insertion
- Shock Prediction Tool

Neutral

- Colloid Infusion
- Hypertonic Saline
- Trendelenburg
- Blood transfusion
- Manual Intraosseous Insertion

Against

- Aggressive Crystalloids
- MAST
- Pressors

Nausea and Vomiting

Supportive

- Antiemetic (Central)
- Antiemetic (GI Action)
- Isopropyl alcohol

Neutral

Against

PV Bleed/Threatened Abortion

Supportive

Neutral

Against

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Roberts I, et al. The CRASH-2 trial: A randomised controlled trial and economic evaluation of the effects of tranexamic acid on death, vascular occlusive events and transfusion requirement in bleeding trauma patients. 2013. [Link]
3. Stovall TG et al. Emergency department diagnosis of ectopic pregnancy. 1990. [Link]
4. WOMAN Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): An international, randomised, double-blind, placebo-controlled trial. 2017. [Link]

L06: Maternal Vaginal Bleeding (> 20 Weeks)

Catherine Malette and Matthew Smith

Updated: May 15, 2023
Reviewed: March 01, 2021

Introduction

Vaginal bleeding in a pregnant patient after 20 weeks gestation is also known as antepartum hemorrhage and specifically refers to bleeding that is unrelated to labour and delivery. In the majority of cases, abruptio placentae (placental abruption) (30%) and placenta previa (20%) are the underlying causes, with uterine rupture and vasa previa being comparatively more rare. Antepartum hemorrhage is associated with complications in pregnancy, including preterm labour and birth. Adverse outcomes are more likely with heavy bleeding or bleeding from non-previa sources.

In assessing women with a suspected antepartum hemorrhage, paramedics and EMRs/FRs must establish if the patient is hemodynamically unstable and begin appropriate treatment while providing safe and expeditious conveyance.

Essentials

- Bleeding during pregnancy is worrisome and always warrants further investigation. Patients showing signs of shock should be treated accordingly.
- The 4 major causes of vaginal bleeding after 20 weeks of gestation are placenta previa, abruptio placentae (placental abruption), uterine rupture, and vasa previa. **Placenta previa, placental abruption, and uterine rupture are lifte-threatening emergencies for both the mother and unborn child, requiring rapid identification and immediate transport to definitive care (emergency Caeserean section).**
- A detailed assessment of the patient and a history of current and past pregnancy must be obtained.

Additional Treatment Information

- Refer to CPG D01 and D02 for additional details on managing shock and bleeding.
  - → D01: Shock
  - → D02: Bleeding
- The management of pregnant patients with vaginal bleeding in the second and third trimesters depends on numerous factors, including the gestational age, the cause of bleeding, the severity of bleeding, and fetal status.

Referral Information

- Every patient presenting with bleeding in the 2nd or 3rd trimester should be assessed and conveyed to the closest and most appropriate facility.
- If the patient is presenting with signs of shock, notifying the hospital ahead of time is likely to improve patient outcome.

General Information

- A placental abruption (abruption placentae) occurs when the placenta separates from the uterine wall prior to the delivery of the neonate. Risk factors for placental abruptions include trauma, smoking, cocaine use, hypertension, preterm (and pre-labour) rupture of membranes, and a history of prior abruptions.
- Placenta previa is a condition where the placenta implants and grows over the internal os. Bleeding occurs when fetal growth, or contractions, disrupts the area over the cervix. Placenta previa should be suspected in any woman with vaginal bleeding in the second half of pregnancy.
- Uterine rupture is a rare cause of vaginal bleeding. It should be considered in the case of any woman with bleeding and a history of either previous caesarean delivery or other transmyometrial surgery. Rupture usually occurs during labour, as a result of abdominal trauma, or occasionally without any obvious cause. Abdominal pain and hemodynamic instability are common, and are signs of an obstetric emergency.
- Vasa previa occurs when fetal blood vessels are present in the membranes covering the internal os. These membranous vessels may be associated with either the umbilical cord, or may connect lobes of a bi-lobed placenta. Rupture of the vasa previa is an obstetric emergency and can lead to rapid fetal death due to exsanguination.

Interventions

First Responder

- Provide position of comfort for patient
- Keep patient warm and prevent heat loss
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Patient assessment - record amount of bleeding
- Warning: **If placenta previa, placental abruption, or uterine rupture are suspected prioritize transport and notify the receiving hospital as early as possible -- these patients require immediate surgical intervention.**
- Convey in left lateral decubitus position with early hospital notification
- Provide supplemental oxygen as required to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
- Consider analgesia as required:
  - → E08: Pain Management
    - Nitrous oxide

Primary Care Paramedic – All FR and EMR interventions, plus:

- Perform gentle abdominal examination
- Consider IV and fluids when appropriate
  - → D03: Vascular Access
- Consider antifibrinolytic therapy
  - Tranexamic acid
  - CliniCall consultation required prior to administration of tranexamic acid.

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Fetal assessment if a doppler is available; alternatively, a POCUS can be used
- No pelvic examination
- Treat for hemorrhagic shock
  - Consider blood products
    - Call ETP for blood products
  - Consider hemodynamic support

Evidence Based Practice

PV Bleed/Threatened Abortion

Supportive

Neutral

Against

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Norwitz, ER. Overview of the etiology and evaluation of vaginal bleeding in pregnant women. In UpToDate. 2020. [Link]
3. Ornge Base Hospital. Adult Medical Directives. 2016. [Link]

L07: Preterm Labour

Catherine Malette and Matthew Smith

Updated: May 27, 2021
Reviewed: March 01, 2021

Introduction

A preterm birth occurs when a neonate is delivered between 20 and 37 weeks of gestation. It may or may not be preceded by preterm labour. Up to 80% of preterm births are spontaneous, resulting from preterm labor, or premature rupture of membranes (PROM). Rarely, incompetent cervix, or cervical insufficiency, can be responsible for a preterm birth. Other causes involve maternal or fetal issues that jeopardize the health of either (or both), such as pre-eclampsia, placenta previa, abruptio placentae (placental abruption), and fetal growth restrictions. The four main factors that lead to preterm labor are intrauterine infection, decidual hemorrhage, excessive uterine stretch, and maternal or fetal stress.

Essentials

- The clinical findings that define true labour are the same regardless of whether the labour occurs at term or not. Signs and symptoms may be present for several hours:
  - Menstrual-like cramping
  - Mild, irregular contractions
  - Lower back ache
  - Pressure sensation in the vagina or pelvis
  - Vaginal discharge of mucus, which may be clear, pink, or slightly bloody (i.e., mucus plug, bloody show)
  - Spotting or light bleeding
- Preterm premature rupture of membranes (PPROM) presents a significant risk for preterm labour, but does not necessarily signify that delivery is imminent, though most pregnancies with PROM deliver within one week of rupture. Another common complication associated with PPROM is chorioamnionitis, an infection of the membrane and amniotic fluid. This poses a serious threat to both mother and neonate.
- Care for preterm neonates is challenging at best in the out-of-hospital field. An emphasis must be placed on maintaining warmth while attempting to properly assess the infant. Low APGAR scores are often expected for preterm infants.
- For interfacility transfers: Patients with pain or possible labour contractions should have prior documentation of: duration and severity of contractions; frequency of contractions; cervical dilation; progress of labour; and fetal fibronectin testing results if available. In general, interfacility transfers should not be initiated with patients presenting with cervical dilation greater than 4-6 cm. However, the decision to convey is based on labour progression, parity, obstetrical and history, gestational age, and conveyance time.

Referral Information

- Any pregnant patient presenting with signs of preterm labour should be conveyed to the closest, most appropriate facility. The receiving centre should have NICU capabilities.
- Patients who are more than 34 weeks pregnant and in active labour will likely be admitted for delivery. Patients who are less than 34 weeks pregnant will likely receive care attempting to delay delivery.

General Information

There is a high probability of malpresentation with preterm labour. Consider reviewing L08: Delivery Complications (breech, limb presentation, cord prolapse and shoulder dystocia).

Interventions

First Responder

- Provide position of comfort
- Keep patient warm and prevent heat loss
- Assess the patient - including vital signs and detailed pregnancy assessment

- Determine if birth is imminent
  - If birth is imminent, seek additional assistance urgently
  - Prepare for delivery and resuscitation
  - Position neonate carefully: keep neonate head midline and elevated 15 degrees

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access when appropriate
  - → D03: Vascular Access

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider tocolytics
  - For patients in preterm labour, the goal is to avoid delivery during conveyance
  - Tocolytics should be strongly considered in order to minimize risk of delivery outside the hospital environment
  - Indomethacin or niFEDIPine can be considered for the tocolytic
- Sending facilities may have initiated some or all of the following:
  - Steroids if < 34 +6/7 weeks for lung maturation
  - Magnesium if < 33 +6/7 weeks for neuroprotection
  - Antibiotics for Group B Strep +ve patients

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Lockwood CJ. Preterm labor: Clinical findings, diagnostic evaluation, and initial treatment. In UpToDate. 2020. [Link]
3. Robinson JN. Preterm birth: Risk factors, interventions for risk reduction, and maternal prognosis. In UpToDate. 2020. [Link]

L08: Complications of Delivery

Catherine Malette and Matthew Smith

Updated: August 21, 2021
Reviewed: March 01, 2021

Introduction

Delivery complications include the following topics: breech delivery; limb presentation; cord prolapse; and shoulder dystocia.

Essentials

- Breech presentation: The fetus whose presenting part is the buttocks and/or feet.
  - Most fetuses with persistent breech presentation are delivered by cesarean delivery, which is associated with a clinically significant decrease in perinatal/neonatal mortality and neonatal morbidity compared with vaginal delivery
  - Breech can be frank, complete, or footling - treatment is the same
- Single limb presentation: This is a critical presentation which is immediately life threatening to both mother and neonate. Rapid conveyance is indicated.
- Cord prolapse: The cord is the primary presenting part. This is immediately life threatening to the fetus and requires rapid recognition and conveyance.
- Shoulder dystocia: The anterior shoulder of the fetus is impacted against the symphysis pubis of the mother.

Additional Treatment Information

Breech presentation

- If breech, hands off neonate until body has been born to umbilicus. Allow head to deliver spontaneously, gently lift and hold the neonate upwards and backwards while avoiding hyperextension.
- If head does not deliver within 3 minutes of the body, it is an immediate life-threatening emergency.
- Paramedics and EMRs should initiate rapid conveyance; paramedics may attempt the Mauriceau-Smellie-Veit manoeuvre (M-S-V) repeatedly until neonate delivers or an obstetrical facility is reached.
- Cord prolapse and meconium contamination are more common in breech presentations.

Limb presentation

- Do not attempt to deliver. Do not delay on scene. Cover the limb using a dry sheet to maintain warmth and initiate rapid conveyance to a facility capable of performing a caesarean section. Provide supportive care to the mother.
- Position mother kneeling if possible. Do not touch presenting part.

Shoulder dystocia

- This is an immediate life-threatening situation that occurs when the anterior shoulder of the fetus is impacted against the symphysis pubis of the mother. Mortality greatly increases if the fetus is not delivered after 5-10 minutes of the initial presentation.
- Declare the emergency and explain the situation to gain maximum cooperation from the mother and those in attendance.
- The newborn is likely to be compromised and in need of resuscitation. Follow CPG M09: Neonatal Resuscitation.
- Shoulder dystocia can be predicted by larger fetal size and a previous history of shoulder dystocia.
- Shoulder dystocia can be diagnosed after crowning and a failure to progress, or “turtling” where the mother pushes and the neonate advances, then retracts when pushing stops.
- It is suggested to remain on scene for a maximum of 10 minutes or 2 rotations of the HELPERR procedure, then initiate rapid conveyance (note not all steps of the HELPERR procedure are within BCEHS Scope of Practice). Attempt delivery between each step:
  - H - Immediately declare emergency and call for help
  - E - Evaluate for episiotomy **NOT AUTHORIZED**
  - L - Legs up: position the mother’s hips in a hyperflexed (McRobert’s) position for 30-60 seconds
  - P - Apply supra pubic pressure in time with contractions

  - E - Enter vagina with 2 fingers to perform rotational maneuvers NOT AUTHORIZED
  - R - Remove the posterior arm NOT AUTHORIZED
  - R - Roll patient onto hands and knees (Gaskin) and apply downward traction to delivery anterior shoulder

Cord prolapse

- This is a time sensitive critical emergency - early diagnosis, immediate intervention, and conveyance to the appropriate facility are effective in reducing the perinatal mortality rate. Cord prolapse can be predicted by a history of a fetus that is small for gestational age, a preterm birth, or an unstable lie.
- In an umbilical cord prolapse, minimize manipulation of the overtly exposed cord and protect it from the cold environment with warm saline or water soaked gauze. Excessive manipulation can exacerbate umbilical vasospasm, decreasing perfusion to the neonate. In the case of cord compression by the fetal head, manual elevation of the fetal head may be required.
- Position mother with knees to chest and face down. Alternately, during conveyance, left-lateral tilt with hip padding is advised. Notify receiving hospital early.
  WARNING: THE KNEES-TO-CHEST POSITION IS UNSAFE DURING CONVEYANCE.
- If a cord prolapse is present, the presenting part, usually the fetal head, should be elevated to relieve pressure on the cord. Assist the patient into the knees-to-chest position and insert a sterile gloved hand into the vagina to apply manual digital pressure to the presenting part of the fetus which is maintained until transfer of care in a hospital.

Nuchal cord

- If nuchal cord is present and loose, slip cord over the neonate's head. If nuchal cord is tight and cannot be slipped over the neonate's head and neonatal distress is present, apply 2 clamps and cut the cord in between the clamps; encourage rapid delivery.
- Following delivery of the neonate, the cord should be clamped and cut immediately IF neonatal or maternal resuscitation is required. Otherwise, delayed cord clamping (after approximately 2 minutes) is preferred. Place the first clamp 10 centimeters from the neonate and the second clamp 5 centimeters further. Cut between the clamps. Place the neonate on the maternal chest and encourage breastfeeding. Manage postpartum bleeding as required. If placenta has not delivered within 30 minutes, initiate rapid conveyance.

Referral Information

- All cases of delivery complications must be conveyed to the closest, most appropriate facility, unless birth is imminent. Certain complications are a surgical emergency and require rapid conveyance with notification, as specialty services may be required.
- Smaller facilities, although ill equipped to handle complex deliveries, can often safely perform caesarean sections, which can be lifesaving for both the mother and the neonate.
- Immediate conveyance of limb presentation and cord prolapse patients is indicated.
- It is suggested to attempt to deliver breech and shoulder dystocia patients in the field initially. After 10 minutes, provide rapid conveyance as the timeline to neonatal mortality increases. Rapid conveyance without attempting delivery leads to increased neonatal mortality.

Interventions

First Responder

- Provide position of comfort for patient
- Keep patient warm and prevent heat loss

Emergency Medical Responder – All FR interventions, plus:

- Convey as soon as possible to closest facility
- Consider intercept with additional resources
- Consider analgesia
  - Nitrous oxide
- See Additional Treatment Information above for managing specific complications
- If cord prolapse suspected, provide supplemental oxygen and initiate rapid conveyance
  - → A07: Oxygen Administration

Primary Care Paramedic – All FR and EMR interventions, plus:

- Establish vascular access and consider fluid bolus to correct hypoperfusion or hypotension if clinically indicated
  - → D03: Vascular Access

Evidence Based Practice

Childbirth/Post Natal Mother Care

Supportive

- Syntocinon

Neutral

- Uterine Massage

Against

L09: Postpartum Hemorrhage

Alex Kuzmin

Updated: June 02, 2021
Reviewed: March 01, 2021

Introduction

Postpartum hemorrhage is defined as a cumulative blood loss greater than 500 mL, or bleeding associated with signs and symptoms of hypovolemia within the first 24 hours following birth. It is an obstetric emergency and one of the top five causes of maternal mortality; the loss of blood can be significant, as the uterine artery blood flow at term can be as high as 750 mL/minute and can account for up to 15% of cardiac output.

Causes of postpartum hemorrhage include the "Four Ts":

- Tone (uterine atony, the most common cause)
- Trauma (to genital structures)
- Tissue (retention of placenta or membranes)
- Thrombin (coagulopathy)

Patients at higher risk of postpartum hemorrhage include women with multiple pregnancies (more than four), a past history of postpartum or antepartum hemorrhage, and a large baby.

Normally, the fundus will not become firm and contracted until the placenta is delivered. Avoid fundal massage prior to placental delivery and continue to check for vaginal bleeding while observing vital signs. In cases of postpartum hemorrhage prior to placental delivery, consider performing fundal massage as increased uterine tone can promote placental separation and potentially decrease postpartum hemorrhage.

Essentials

- Assess for fundal tone, visible blood loss, and perineal or vaginal lacerations.
- Quantify blood loss: use abdominal pads to collect blood and calculate weight difference on hospital arrival. With uterine atony, blood loss can be significantly greater than what is observed externally. Look for signs of hypovolemia closely.
- In an unstable patient, assess vital signs and shock index, and treat as per CPG D01: Shock

Additional Treatment Information

- Fundus is firm: provide high-flow oxygen; correct hypvolemia with up to 40 mL/kg normal saline; administer tranexamic acid while en route. Manage visible lacerations with direct pressure and dressings.
- Fundus is not firm: provide uterine massage (firm pressure in a circular motion with a cupped hand).
  - Encourage mother to empty bladder if possible; a full bladder will impede and prevent contractions of the uterus, which will prevent uterine emptying, exacerbating blood retention, atony, and hemorrhage
  - Encourage infant to suckle breast
  - The placenta should naturally deliver on its own within 30-60 minutes; manipulation is not authorized
  - Do NOT attempt active delivery of placenta due to risk of uterine inversion

Referral Information

Conveyance to a hospital with obstetrical and surgical facilities is preferred. Contact CliniCall for additional guidance.

General Information

- In most cases, postpartum hemorrhage is a malfunction of one of the body's mechanisms of uterine bleeding control; these include myometrial contraction causing direct compression of the blood vessels, and local hemostatic factors that promote clotting.
- If bleeding remains uncontrolled despite oxytocin or carboprost/Hemabate and tranexamic acid, surgical intervention is likely to be required.

Interventions

First Responder

- Provide position of comfort for patient
- Keep patient warm and prevent heat loss
- Provide supplemental oxygen
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Notify hospital while en route
- Provide analgesia if required
  - → E08: Pain Management
    - Nitrous oxide
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypoperfusion
  - → D03: Vascular Access
  - 2 large-bore IVs preferred
  - Resuscitate to perfusion or mentation with warmed IV fluids where possible
- In cases of postpartum hemorrhage and shock, consider anti-fibrinolytic therapy
  - Tranexamic acid
  - CliniCall consultation required prior to administration of tranexamic acid.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider advanced airway management only if necessary
- Consider analgesia
  - → E08: Pain Management

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consult OB/GYN for choice of uterotonic medications and further treatment
- Advanced diagnostics if in remote ER setting (ultrasound, CBC, type and screen, lactate)
- Consider blood products
  - Call ETP prior to blood product
- Reverse anticoagulation
  - Call ETP prior to blood product
- Insert Foley catheter
- Consider laparotomy by local surgeon as a temporizing measure if OB/GYN not available

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Roberts I, et al. The CRASH-2 trial: A randomised controlled trial and economic evaluation of the effects of tranexamic acid on death, vascular occlusive events and transfusion requirement in bleeding trauma patients. 2013. [Link]
3. WOMAN Trial Collaborators. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): An international, randomised, double-blind, placebo-controlled trial. 2017. [Link]

L10: Pregnancy and Trauma

Catherine Malette and Matthew Smith

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Reviewed: March 01, 2021

Introduction

Evaluation of the pregnant patient with major trauma presents a unique challenge for paramedics and EMRs/FRs since the presence of a fetus means that two patients are potentially at risk. Most cases of maternal major trauma are the result of motor vehicle collisions and domestic or intimate partner violence, but falls, burns, homicide, penetrating trauma, and toxic exposure can also be responsible. Compression of a pregnant patient's abdomen as a result of a fall, intentional violence, or a low-speed motor vehicle collision can be considered major trauma.

Essentials

- Paramedics and EMRs/FRs can quickly make a rough estimation of the gestational age by feeling the uterine fundus: if the fundus is below the patient's umbilicus, the pregnancy is likely less than 20 weeks.
- Pregnancy causes significant physiological changes, and as a result, traumatically injured pregnant patients may take longer to show signs of shock.

General Information

- Every female of reproductive age with significant injuries should be considered pregnant until proven otherwise by a definitive pregnancy test or ultrasound scan. (III-C)
- A nasogastric tube should be inserted in a semiconscious or unconscious injured pregnant patient to prevent aspiration of acidic gastric content. (III-C)
- Oxygen supplementation should be given to maintain maternal oxygen saturation > 95% to ensure adequate fetal oxygenation. (II-1B)
- If needed, a thoracostomy tube should be inserted in an injured pregnant patient 1 or 2 intercostal spaces higher than usual. (III-C)
- Two large bore (14 to 16 gauge) intravenous lines should be placed in a seriously injured pregnant patient. (III-C)
- Because of their adverse effect on uteroplacental perfusion, vasopressors in pregnant patients should only be used for intractable hypotension that is unresponsive to fluid resuscitation. (II-3B)
- After mid-pregnancy, the gravid uterus should be moved off the inferior vena cava to increase venous return and cardiac output in the acutely injured pregnant patient. This may be achieved by manual displacement of the uterus or utilizing a left lateral tilt position. Care should be taken to secure the spinal cord when using left lateral tilt. (II-1B)
- To avoid rhesus D (Rh) alloimmunization in Rh-negative pregnant patients, O-negative blood should be transfused when needed until cross-matched blood becomes available. (I-A)
- In traumatic maternal cardiac arrest, consider rapid conveyance to hospital. A caesarean section should be performed for viable pregnancies (≥ 23 weeks) no later than 4 minutes (when possible) following maternal cardiac arrest to aid with maternal resuscitation and fetal salvage.
- Transfer or conveyance to a maternity facility (triage of a labour and delivery unit) is advocated when injuries are neither life nor limb-threatening and the fetus is viable (≥ 23 weeks), and to the emergency room when the fetus is under 23 weeks gestational age or considered to be non-viable. When the injury is major, the patient should be transferred or conveyed to a trauma unit or emergency room, regardless of gestational age. (III-B)
- When the severity of injury is undetermined or when the gestational age is uncertain, the patient should be evaluated in a trauma unit or emergency room to rule out major injuries. (III-C)
- Women who are pregnant experience a number of physiological changes. Of relevance to paramedics and EMRs/FRs:
  - Cardiovascular
    - Blood pressure experiences minimal changes, though there is an initial decrease in the first and second trimesters, with a return to baseline in the third. Systolic blood pressures > 170 mmHg and diastolic pressures > 110 mmHg are considered significant.
    - Heart rates elevate by 15 to 20 beats per minute. Normal heart rates in pregnancy are between 80 and 110 beats per minute.
    - Cardiac output increases by 30-40%, to a normal volume of 6-7 L per minute during pregnancy.
    - Non-specific ST segment changes are sometimes seen on an ECG, along with Q waves in leads III and aVF, and atrial and

ventricular ectopic beats.
    - Systemic vascular resistance often decreases due to blood volume and the effects of progesterone.
  - Respiratory
    - Respiratory rate increases by 15% (2-3 breaths/minute).
    - Oxygen demand increases by 15-20%.
    - Tidal volume and minute ventilation increase by 25-50%.
    - Arterial pH rises to 7.40–7.45.
    - PaO_2 increases by 10 mmHg.
    - $PaCO_2$ decreases to 27-32 mmHg.
  - Hematological
    - Blood volume increases by 30-50%.
    - Hemoglobin falls to 100-140 g/L.
    - Hematocrit falls to 32-42, producing physiological anemia.
    - Plasma volume increases by 30-50%.
    - Platelet count experiences a small reduction.
    - Pregnancy is a pro-coagulant state. A variety of changes occur in pro- and anti-coagulant pathways, which on the whole increases the coagulation potential while reducing anticoagulation and fibrinolysis.
  - Gastrointestinal
    - Pregnant women are at high risk of gastric aspiration, most likely related to decreased lower esophageal sphincter tone and increased intra-abdominal pressure. Gastric emptying is not affected by pregnancy, though it is slowed by labour and opioid analgesics.
  - Renal
    - The glomerular filtration rate and renal blood flow rise markedly during pregnancy. Serum creatinine concentration falls accordingly.
  - The pelvic vasculature is dilated in pregnancy. Injury to the pelvis can result in rapid exsanguination. Uterine blood flow is as high as 600 mL/minute in the third trimester and is not subject to autoregulation: a decrease in maternal systolic blood pressure can cause a significant fall in blood flow and, in turn, fetal oxygenation.
- Always consider the possibility of an abrupted placenta in any pregnant woman being assessed following a traumatic injury.

Interventions

First Responder

- Provide position of comfort for patient
- Keep patient warm and prevent heat loss
- Provide airway management and supplemental oxygen as required
  - → B01: Airway Management
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Apply spinal motion restriction as indicated; package patients in a left lateral tilt position to prevent occlusion of the inferior vena cava
- Consider intercept with additional resources
- Convey following local trauma clinical pathway guidelines
  - CliniCall consultation recommended if destination choice is unclear.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Establish vascular access, and consider fluid bolus to correct hypoperfusion or hypotension if clinically indicated
  - → D03: Vascular Access
- Consider tranexamic acid in cases of shock secondary to blood loss and hypovolemia secondary to occult bleeding
  - CliniCall consultation required prior to administration of tranexamic acid.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Airway management
    - Early intubation is warranted if unable to achieve adequate oxygenation

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Treat for shock
    - Call ETP prior to blood products
    - Consider blood products

References

Society of Obstetricians and Gynaecologists of Canada. Guidelines for the Management of a Pregnant Trauma Patient. 2015. [Link]

0-28 days

***Weight (KG):** 3.3- 4.15

Weight (Lbs): 7.2-9.14

Heart Rate (Beats per minute): 104-162

Respiratory Rate (Breaths per minute): 31-60

Blood Pressure (Systolic Range/ Diastolic Range): 60-80/30-53

MAP (mmHg): 40 or higher

Broselow color: Grey

* Weight based on Broselow Tape

**Vitals based on BC PEWS

Airway Equipment

Premature, 1.5 kg (3.3 lbs)

	Values	Formula
Tidal Volume	10 mL	4-8 mL/kg
Laryngoscope	0 - 1 Straight	-
Un-cuffed ETT	2.5 - 3 mm	(Age/4)+4
Cuffed ETT	2 - 2.5 mm	(Age/4)+3
ETT Depth	7.5 - 9 cm	3 (ETT Size)
i-Gel SGA	N/A	-
NPA	-	-
OPA	40 mm (pink)	-
Suction Cath	6 Fr	-

Airway Induction Doses

Premature, 1.5 kg (3.3 lbs)

	Values	Details
Normal Saline Bolus (IV)	15 ml	10 ml/kg
ketAMINE (IV/IO)	1.5 mg	1 mg/kg
EPINEPHrine (Slow IVP/IO)	15 mcg	1.0 mcg/kg
MIDAZOLam (IV/IO)	0.15 mg (150 mcg)	0.1 mg (100 mcg)/kg PRN

Maintenance doses on PR18: Anesthesia Induction Page

Respiratory & Allergic Reaction

Premature, 1.5 kg (3.3 lbs)

	Values	Details
DiphenhydrAMINE (IM/IV)	1.5 mg	1 mg/kg
EPINEPHrine (IM)	0.02 mg (20 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg
EPINEPHrine (Neb)	5 mg	0.5 mg (500 mcg)/kg in 5 mL N/S; Max 5 mg
EPINEPHrine (IV)	0.01 mg (10 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg
Salbutamol (Neb)	2.5 mg	-
Salbutamol (MDI)	---	NOT indicated
Magnesium Sulfate (IV infusion)	75 mg	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

Premature, 1.5 kg (3.3 lb)

	Values	Details
Defibrillation	3/6 J	2 & 4 J/kg
EPINEPHrine (IV)	0.02 mg (20 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
EPINEPHrine (ETT)	0.2 mg (200 mcg)	0.1 mg (100 mcg)/kg; Max 10 mg
Amiodarone (IV)	7.5 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	1.5 mg	1 mg/kg
Lidocaine (ETT)	1.5 mg	2 mg/kg
Sodium Bicarbonate (IV)	1.5 mEq	1 mEq/kg; May repeat
Magnesium Sulfate (IV)	75 mg	50 mg/kg; Max 4g
Calcium Chloride (IV)	30 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	0.2 mg (200 mcg)	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	0.2 mg (200 mcg)	0.2 mg (200 mcg)/kg; Max 4 mg

Tachycardia

Premature, 1.5 kg (3.3 lbs)

	Values	Details
Adenosine **(IV)**	0.2/0.4 mg (200/400 mcg)	0.1 & 0.2 mg (100 mcg & 200 mcg)/kg
Amiodarone **(IV infusion)**	7.5 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	1/2 J	0.5 & 1.0 J/kg

Bradycardia

Premature, 1.5 kg (3.3 lbs)

	Values	Details
EPINEPHrine (IV)	0.02 mg (20 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes
Atropine (IV)	0.1 mg (100 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); Min single dose 0.1 mg (100 mcg); May repeat once
Atropine (ETT)	0.06 mg (60 mcg)	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x5 in 3-5 minutes

Fluid Resuscitation

Premature, 1.5 kg (3.3 lbs)

	Values	Details
Normal Saline	7.5 mL (Max 30 mL)	5 mL/kg bolus x4; Max 20 mL/kg

Sedation, Seizure, & Analgesia

Premature, 1.5 kg (3.3 lbs)

	Values	Details
Midazolam (IM/IN/ETT)	0.4 mg (400 mcg)	0.2 mg (200 mcg)/kg; Max 10 mg
Midazolam (IV)	0.2 mg (200 mcg)	0.1 mg (100 mcg)/kg; Max 5 mg
Morphine (IV/IM)	0.2 mg (200 mcg)	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM)	1.5 mg	1 mg/kg
Acetaminophen (PO/PR)	20 mg (0.25 mL)	15 mg/kg (80 mg/mL)

Poisoning & Overdose

Premature, 1.5 kg (3.3 lbs)

	Values	Details
Naloxone (IV/IM)		Should not be administered to neonates due to risk of acute withdrawal. Contact CliniCall to discuss options.
Glucagon (IV)	0.15 mg (150 mcg)	0.1 mg (100 mcg)/kg IV for beta-blocker overdose

Diabetic

Premature, 1.5 kg (3.3 lbs)

	Values	Details
Dextrose 10% (D10W)	8 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	0.05 mg (50 mcg)	0.03 mg (30 mcg)/kg; Max 1 mg

1 month-3 months (<3 months)

***Weight (KG):** 3-5KG

Weight (Lbs): 6.6-11.0

Heart Rate (Beats per minute): 104-162

Respiratory Rate (Breaths per minute): 31-60

Blood Pressure (Systolic Range/ Diastolic Range): 73-105/36-68

MAP (mmHg):48 or higher

Broselow color: Grey

* Weight based on Broselow Tape

**Vitals based on BC PEWS

Airway Equipment

Newborn, 3.5 kg (7.7 lbs), Broselow Grey

	Values	Formula
Tidal Volume	20 mL	4-8 mL/kg
Laryngoscope	0-1 Straight	-
Un-cuffed ETT	2.5-3 mm	(Age/4)+4
Cuffed ETT	2-2.5 mm	(Age/4)+3
ETT Depth	7.5-9 cm	-
i-Gel SGA	Size 1 (pink)	2-5 kg
NPA	14 Fr	-
OPA	40 mm (pink)	-
Suction Cath	6-8 Fr	-

Airway Induction Doses

Newborn, 3.5 kg (7.7 lbs), Broselow Grey

	Values	Details
Normal Saline Bolus (IV)	35 mL	10 ml/kg
ketAMINE (IV/IO)	3.5 mg	1 mg/kg
EPINEPHrine (Slow IVP/IO)	3.5 mcg	1 mcg/kg
MIDAZOLam (IV/IO)	0.35 mg (350 mcg)	0.1 mg (100 mcg)/kg PRN

Maintenance doses on PR18: Anesthesia Induction Page

Respiratory & Allergic Reaction

Newborn, 3.5 kg (7.7 lbs), Broselow Grey

	Values	Details
diphenhydRAMINE (IM/IV)	3.5 mg	1 mg/kg
Epinephrine (IM)	0.04 mg (40 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg)
Epinephrine (Neb)	5 mg	5mg/ in 5ml
Epinephrine (IV)	0.02 mg (20 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg (300 mcg)
Salbutamol (Neb)	2.5 mg	-
Salbutamol (MDI)	---	NOT indicated
Magnesium Sulfate (IV infusion)	175 mg	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

Newborn, 3.5 kg (7.7 lbs), Broselow Grey

	Values	Details
Defibrillation	7/14 J	2 & 4 J/kg
EPINEPHrine (IV)	0.04 mg (40 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
EPINEPHrine (ETT)	0.4 mg (400 mcg)	0.1 mg (100 mcg)/kg; Max 10 mg
AmIODAROne (IV)	17.5 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	3.5 mg	1 mg/kg
Lidocaine (ETT)	3.5 mg	2 mg/kg
Sodium Bicarbonate (IV)	3.5 mEq	1 mEq/kg; May repeat
Magnesium Sulfate (IV)	175 mg	50 mg/kg; Max 4 g
Calcium Chloride (IV)	70 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	0.4 mg (400 mcg)	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	0.4 mg (400 mcg)	0.2 mg (200 mcg)/kg; Max 4 mg

Tachycardia

Newborn, 3.5 kg (7.7 lbs), Broselow Grey

	Values	Details
Adenosine (IV)	0.4/0.8 mg (400/800 mcg)	0.1 & 0.2 mg (100 mcg & 200 mcg)/kg
Amiodarone (IV infusion)	17.5 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	2/4 J	0.5 & 1.0 J/kg

Bradycardia

Newborn, 3.5 kg (7.7 lbs), Broselow Grey

	Values	Details
EPINEPHrine (IV)	0.04 mg (40 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes
Atropine (IV)	0.1 mg (100 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); Min single dose 0.1 mg (100 mcg); May repeat once
Atropine (ETT)	0.14 mg (140 mcg)	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x5 in 3-5 minutes

Fluid Resuscitation

Newborn, 3.5 kg (7.7 lbs), Broselow Grey

	Values	Details
Normal Saline	17.5 mL (70 mL)	5 mL/kg bolus x4; Max 20 mL/kg

Tranexamic Acid

52 mg over 1 minute

Volume of Tranexamic Acid: 0.5 ml

Sedation, Seizure, & Analgesia

Newborn, 3.5 kg (7.7 lbs), Broselow Grey

	Values	Details
MIDAZOLam (IM/IN/ETT)	0.8 mg (800 mcg)	0.2 mg (200 mcg)/kg; Max 10 mg
MIDAZOLam (IV)	0.4 mg (400 mcg)	0.1 mg (100 mcg)/kg; Max 5 mg
Morphine (IV/IM)	0.4 mg (400 mcg)	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM)	3.5 mg	1 mg/kg
Acetaminophen (PO)	50 mg (0.6 mL)	15 mg/kg (80 mg/mL)

Poisoning & Overdose

Newborn, 3.5 kg (7.7 lbs), Broselow Grey

	Values	Details
Naloxone (IV/IM)		Should not be administered to neonates due to risk of acute withdrawal. Contact CliniCall to discuss options.
Glucagon (IV)	0.35 mg (350 mcg)	Beta-blocker overdose 0.1 mg (100 mcg)/kg IV

Diabetic

Newborn, 3.5 kg (7.72 lbs), Broselow Grey

	Values	Details
Dextrose 10% (D10W)	18 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	0.1 mg (100 mcg)	0.03 mg (30 mcg)/kg; Max 1 mg

3-5 months

***Weight (KG):** 6-7 KG

Weight (Lbs): 13.2- 15.4

Heart Rate (Beats per minute): 109-159

Respiratory Rate (Breaths per minute: 29-56

Blood Pressure (Systolic Range/ Diastolic Range): 75-105/40-68

MAP (mmHg): 52 or higher

Broselow color: Pink

* Weight based on Broselow Tape

**Vitals based on BC PEWS

Airway Equipment

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Formula
Tidal Volume	35 mL	4-8 mL/kg
Laryngoscope	0-1 Straight	-
Un-cuffed ETT	3.5 mm	(Age/4)+4
Cuffed ETT	3.0 mm	(Age/4)+3
ETT Depth	10.5 cm	-
i-Gel SGA	Size 1.5 (blue)	5-12 kg
NPA	14 Fr	-
OPA	50 mm (blue)	-
Suction Cath	6-8 Fr	-

Airway Induction Doses

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Details
Normal Saline Bolus (IV)	60 mL	10 mL/kg
ketAMINE (IV/IO)	6 mg	1 mg/kg
EPINEPHrine (Slow IVP/IO)	6 mcg	1 mcg/kg
MIDAZOLam (IV/IO)	0.6 mg (600 mcg)	0.1 mg (100 mcg)/kg PRN

Maintenance doses on Pediatric Induction Guideline Page

Respiratory & Allergic Reaction

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Details
DiphenhydrAMINE (IM/IV)	6 mg	1 mg/kg
EPINEPHrine (IM)	0.06 mg (60 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg)
EPINEPHrine (Neb)	5 mg	5mg in 5ml
EPINEPHrine (IV)	0.03 mg (30 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg (300 mcg)
Salbutamol (Neb)	2.5 mg	-
Salbutamol (MDI)	---	NOT indicated
Ipratropium (Neb)	250mcg	½ nebule
Ipratropium (MDI)	80mcg	20mcg x 4 sprays
Magnesium Sulfate (IV infusion)	300 mg	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Details
Defibrillation	12/24 J	2 & 4 J/kg
EPINEPHrine (IV)	0.06 mg (60 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
EPINEPHrine (ETT)	0.6 mg (600 mcg)	0.1 mg (100 mcg)/kg; Max 10 mg
Amiodarone (IV)	30 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	6 mg	1 mg/kg
Lidocaine (ETT)	6 mg	2 mg/kg
Sodium Bicarbonate (IV)	6 mEq	1 mEq/kg; May repeat
Magnesium Sulfate (IV)	300 mg	50 mg/kg; Max 4 g
Calcium Chloride (IV)	120 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	0.6 mg (600 mcg)	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	1.2 mg	0.2 mg (200 mcg)/kg; Max 8 mg

Tachycardia

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Details
Adenosine (IV)	0.6 mg (600 mcg)/1.2 mg	0.1 & 0.2 mg (100 & 200 mcg)/kg
Amiodarone (IV infusion)	30 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	3/6 J	0.5 & 1.0 J/kg

Bradycardia

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Details
EPINEPHrine (IV)	0.06 mg (60 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes
Atropine (IV)	0.12 mg (120 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); May repeat once
Atropine (ETT)	0.24 mg (240 mcg)	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x5 in 3-5 minutes

Fluid Resuscitation

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Details
Normal Saline	30 mL (120 mL)	5 mL/kg bolus x4; Max 20 mL/kg

Tranexamic Acid

90 mg over 1 minute

Volume of Tranexamic Acid: 0.9 ml

Sedation, Seizure, & Analgesia

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Details
MIDAZOLam (IM/IN/ETT)	1.2 mg	0.2 mg (200 mcg)/kg; Max 10 mg
MIDAZOLam (IV)	0.6 mg (600 mcg)	0.1 mg (100 mcg)/kg; Max 5 mg
Morphine (IV/IM)	0.6 mg (600 mcg)	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM) ***ACP & Above***	7.5 mg	1.25 mg/kg, Max 5 mg/kg/day or Single dose of 25 mg
Acetaminophen (PO/)	90 mg (1.1 mL)	15 mg/kg (80 mg/mL)

Poisoning & Overdose

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Details
Naloxone **(IV/IM)**	0.6 mg (600 mcg)	0.1 mg (100 mcg)/kg; to a maximum of 2 mg/dose. Repeat q 3 mins to effect. No maximum cumulative dose.
Glucagon **(IV)**	0.6 mg (600 mcg)	Beta-blocker overdose 0.1 mg (100 mcg)/kg IV

***Note: Higher doses for naloxone in pediatrics are prescribed as pediatric patients are unlikely to experience withdrawal*

Diabetic

3 months, 6 kg (12.3 lbs), Broselow Pink

	Values	Details
Dextrose 10% (D10W)	30 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	0.18 mg (180 mcg)	0.03 mg (30 mcg)/kg; Max 1 mg

6-11 months

***Weight (KG):** 8-9 kg

Weight (Lbs): 17.6-19.8

Heart Rate (Beats per minute): 95-159

Respiratory Rate (Breaths per minute: 27-53

Blood Pressure (Systolic Range/ Diastolic Range): 82-109/ 40-67

MAP (mmHg): 55-81

Broselow color: Red

* Weight based on Broselow Tape

**Vitals based on BC PEWS

Airway Management

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Formula
Tidal Volume	50 mL	4-8 mL/kg
Laryngoscope	1 Straight	-
Un-cuffed ETT	3.5-4.0 mm	(Age/4)+4
Cuffed ETT	3.0-3.5 mm	(Age/4)+3
ETT Depth	10.5-12 cm	-
i-Gel SGA	Size 1.5 (blue)	5-12 kg
NPA	14 Fr	-
OPA	50 mm (blue)	-
Suction Cath	6-8 Fr	-

Airway Induction Doses

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Details
Normal Saline Bolus (IV)	80 mL	10 ml/kg
ketAMINE (IV/IO)	8 mg	1 mg/kg
EPINEPHrine (Slow IVP/IO)	8 mcg	1.0 mcg/kg
MIDAZOLam (IV/IO)	0.8 mg (800 mcg)	0.1 mg (100 mcg)/kg PRN

Maintenance doses on PR18: Anesthesia Induction Page

Respiratory & Allergic Reaction

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Details
Dexamethasone (PO,IM/IV)	4mg dose = 1ml of (4mg/ml) Dexamethasone Solution administered	0.05mg/kg x 8kg; Supplied 4mg/ml
DiphenhydrAMINE (IM/IV)	8 mg	1 mg/kg
EPINEPHrine (IM)	0.08 mg (80 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg)
EPINEPHrine (Neb)	5 mg	5mg in 5ml
EPINEPHrine (IV)	0.04 mg (40 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg (300 mcg)
Salbutamol (Neb)	2.5 mg	1 nebule
Salbutamol (MDI)	---	NOT indicated
Ipratropium (Neb)	250mcg	½ nebule
Ipratropium (MDI)	80mcg	20mcg x 4 sprays
Magnesium Sulfate (IV infusion)	400 mg	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Details
Defibrillation	16/32 J	2 & 4 J/kg
EPINEPHrine (IV)	0.08 mg (80 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
EPINEPHrine (ETT)	0.8 mg (800 mcg)	0.1 mg (100 mcg)/kg; Max 10 mg
Amiodarone (IV)	40 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	8 mg	1 mg/kg
Lidocaine (ETT)	16 mg	2 mg/kg
Sodium Bicarbonate (IV)	8 mEq	1 mEq/kg; May repeat
Magnesium Sulfate (IV)	400 mg	50 mg/kg; Max 4 g
Calcium Chloride (IV)	160 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	0.8 mg (800 mcg)	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	1.6 mg	0.2 mg (200 mcg)/kg; Max 8 mg

Tachycardia

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Details
Adenosine (IV)	0.8 (800 mcg)/1.6 mg	0.1 & 0.2 mg (100 & 200 mcg)/kg
Amiodarone (IV infusion)	40 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	4/8 J	0.5 & 1.0 J/kg

Bradycardia

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Details
EPINEPHrine (IV)	0.08 mg (80 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes
Atropine (IV)	0.16 mg (160 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); May repeat once
Atropine (ETT)	0.32 mg (320 mcg)	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x5 in 3-5 minutes

Fluid Resuscitation

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Details
Normal Saline	40 mL (160 mL)	5 mL/kg bolus x4; Max 20 mL/kg

Tranexamic Acid

120 mg over 1 minute

Volume of Tranexamic Acid: 1.2 ml

Sedation, Seizure, & Analgesia

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Details
MIDAZOLam (IM/IN/ETT)	1.6 mg	0.2 mg (200 mcg)/kg; Max 10 mg
MIDAZOLam (IV/IO)	0.8 mg (800 mcg)	0.1 mg (100 mcg)/kg; Max 5 mg
Morphine (IV/IM)	0.8 mg (800 mcg)	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM) ***ACP & Above***	10 mg	1.25 mg/kg, Max 5 mg/kg/day or Single dose of 25 mg
Acetaminophen (PO)	120 mg (1.5 mL)	15 mg/kg (80 mg/mL)

Poisoning & Overdose

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Details
Naloxone **(IV/IM)**	0.8 mg (800 mcg)	0.1 mg (100 mcg)/kg; to a maximum of 2 mg/dose. Repeat q 3 mins to effect. No maximum cumulative dose.
Glucagon **(IV)**	0.8 mg (800 mcg)	Beta-blocker overdose 0.1 mg (100 mcg/kg IV

***Note: Higher doses for naloxone in pediatrics are prescribed as pediatric patients are unlikely to experience withdrawal*

Diabetic

6 months, 8 kg (17.6 lbs), Broselow Red

	Values	Details
Dextrose 10% (D10W)	40 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	0.24 mg (240 mcg)	0.03 mg (30 mcg)/kg; Max 1 mg

Normal Vital Signs

12-24 months

***Weight (KG):** 10-11kg

Weight (Lbs): 22-24.3

Heart Rate (Beats per minute): 89-149

Respiratory Rate (Breaths per minute): 27-44

Blood Pressure (Systolic Range/ Diastolic Range): 85-107/ 40-67

MAP (mmHg): 55-81

Broselow color: Purple

* Weight based on Broselow Tape

**Vitals based on BC PEWS

Airway Equipment

1 Year, 10 kg (20 lbs), Broselow Purple

	Values	Formula
Tidal Volume	60 mL	4-8 mL/kg
Laryngoscope	1 Straight	-
Un-cuffed ETT	4.0 mm	(Age/4)+4
Cuffed ETT	3.5 mm	(Age/4)+3
ETT Depth	12 cm	-
i-Gel SGA	Size 1.5 (blue)	5-12 kg
NPA	14 Fr	-
OPA	50 mm (blue)	-
Suction Cath	8 Fr	-

Airway Induction Doses

1 Year, 10 kg (20 lbs), Broselow Purple

	Values	Details
Normal Saline Bolus (IV)	100 mL	10 mL/kg
ketAMINE (IV/IO)	10 mg	1 mg/kg
EPINEPHrine (Slow IVP/IO)	10 mcg	1.0 mcg/kg
MIDAZOLam (IV/IO)	1.0 mg	0.1 mg (100 mcg)/kg PRN

Maintenance doses on PR18: Anesthesia Induction Page

Respiratory & Allergic Reaction

1 Year, 10 kg (20 lbs), Broselow Purple

	Values	Details
Dexamethasone (P0/IM/IV)	5 mg dose = 1.25mL Dexamethasone solution administered	10kg x 0.5mg/kg = 5mg 4mg/mL Dextrose solution =1.25mL
DiphenhydrAMINE (IM/IV)	10 mg	1 mg/kg
EPINEPHrine (IM)	0.1 mg (100 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg)
EPINEPHrine (Neb)	5 mg	0.5 mg (500 mcg in 5 mL N/S; Max 5 mg
EPINEPHrine (IV)	0.05 mg (50 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg (300 mcg)
Salbutamol (Neb)	5 mg	2 nebules
Salbutamol (MDI)	500 mcg	5 x 100 mcg per course; may repeat up to 3 times
Ipratropium (Neb)	250mcg	½ nebule
Ipratropium (MDI)	80 mcg	20mcg x 4 sprays
Magnesium Sulfate (IV infusion)	500 mg	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

1 Year, 10kg (20.05lbs), Broselow Purple

	Values	Details
Defibrillation	20/40 J	2 & 4 J/kg
Epinephrine (IV)	0.1 mg (100 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
Epinephrine (ETT)	1 mg	0.1 mg (100 mcg)/kg; Max 10 mg
Amiodarone (IV)	50 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	10 mg	1 mg/kg
Lidocaine (ETT)	20 mg	2 mg/kg
Bicarb (IV)	10 mEq	1 mEq/kg; May repeat
MgSO4 (IV)	500 mg	50 mg/kg; Max 4 g
Calcium (IV)	200 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	1 mg	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	2 mg	0.2 mg (200 mcg)/kg; Max 8 mg

Tachycardia

1 Year, 10 kg (20 lbs), Broselow Purple

	Values	Details
Adenosine (IV)	1/2 mg	0.1 & 0.2 mg (100 & 200 mcg)/kg
Amiodarone (IV infusion)	50 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	5/12 J	0.5 & 1.0 J/kg

Bradycardia

1 Year, 10 kg (20 lbs), Broselow Purple

	Values	Details
EPINEPHrine (IV)	0.1 mg (100 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes
Atropine (IV)	0.2 mg (200 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); May repeat once
Atropine (ETT)	0.4 mg (400 mcg)	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x5 in 3-5 minutes

Fluid Resuscitation

1 Year, 10 kg (20 lbs), Broselow Purple

	Values	Details
Normal Saline	50 mL (200 mL)	5 mL/kg bolus x4; Max 20 mL/kg

Tranexamic Acid

150 mg over 1 minute

Volume of Tranexamic Acid: 1.5 ml

Sedation, Seizure, & Analgesia

1 Year, 10 kg (20 lbs), Broselow Purple

	Values	Details
KetAMINE (IN)	15 mg	1.5 mg/kg, Max 50 mg *
KetAMINE (IM)	5 mg	0.5 mg (500 mcg)/kg *
KetAMINE (IV/IO)	3 mg	0.3 mg (300 mcg)/kg, Single Dose Max 20 mg, Max Total 0.6 mg (600 mcg)/kg *
MIDAZOLam (IM/IN)	2 mg	0.2 mg (200 mcg)/kg; Max 10 mg
MIDAZOLam (IV/IO)	1 mg	0.1 mg (100 mcg)/kg; Max 5 mg
FentaNYL (IN)	15 mcg - 20 mcg	1.5-2.0 mcg/kg, Single Dose Max 100 mcg
FentaNYL (IM/IV/IO)	10 mcg - 20 mcg	1-2 mcg/kg, Single Dose Max 50 mcg q 5 min, Max Total 200 mcg
Morphine (IV/IM)	1 mg	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM) *ACP & Above*	12.5 mg	1.25 mg/kg, Max 5 mg/kg/day or Single dose of 25 mg
Ondansetron (IV)	1 mg	0.1 mg (100 mcg)/kg
Ibuprofen (PO)	100 mg	10 mg/kg
Acetaminophen (PO)	150 mg (1.9 mL)	15 mg/kg (80 mg/mL)

*See drug monographs for repeat dosages

Poisoning & Overdose

1 Year, 10 kg (20 lbs), Broselow Purple

	Values	Details
Naloxone (IV/IM)	1 mg	0.1 mg (100 mcg)/kg; to a maximum of 2 mg/dose. Repeat q 3 mins to effect. No maximum cumulative dose.
Glucagon (IV)	1 mg	Beta-blocker overdose 0.1 mg (100 mcg)/kg IV

***Note: Higher doses for naloxone in pediatrics are prescribed as pediatric patients are unlikely to experience withdrawal*

Diabetic

1 Year, 10 kg (20 lbs), Broselow Purple

	Values	Details
Dextrose 10% (D10W)	50 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	0.3 mg (300 mcg)	0.03 mg (30 mcg)/kg; Max 1 mg

Normal Vital Signs

2 years

***Weight (KG):** 12-14kg

Weight (Lbs): 26.5-30.9

Heart Rate (Beats per minute): 89-145

Respiratory Rate (Breaths per minute): 25-39

Blood Pressure (Systolic Range/ Diastolic Range): 87-112/44-74

MAP (mmHg): 57-81

Broselow color: Yellow

* Weight based on Broselow Tape

**Vitals based on BC PEWS

Airway Management

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Formula
Tidal Volume	70 mL	4-8 mL/kg
Laryngoscope	1 Straight	-
Un-cuffed ETT	4 mm	(Age/4)+4
Cuffed ETT	3.5 mm	(Age/4)+3
ETT Depth	12 cm	-
i-Gel SGA	Size 2 (grey)	10-25 kg
NPA	18 Fr	-
OPA	60 mm (black)	-
Suction Cath	8 Fr	-

Airway Induction Doses

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Details
Normal Saline Bolus (IV)	120 mL	10 ml/kg
ketAMINE (IV/IO)	12 mg	1 mg/kg
EPINEPHrine (Slow IVP/IO)	12 mcg	1.0 mcg/kg
MIDAZOLam (IV/IO)	1.2 mg	0.1 mg/kg PRN

Maintenance doses on PR18: Anesthesia Induction Page

Respiratory & Allergic Reaction

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Details
Dexamethasone	6mg dose = 1.50 mL Dexamethasone solution administered	12kg x 0.5mg/kg = 6mg 4mg/ml Dexamethasone supplied =1.5mL
DiphenhydrAMINE (IM/IV)	12 mg	1 mg/kg
EPINEPHrine (IM)	0.12 mg (120 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg)
EPINEPHrine (Neb)	5 mg	0.5 mg (500 mcg) in 5 mL N/S; Max 5 mg
EPINEPHrine (IV)	0.06 mg (60 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg (300 mcg)
Salbutamol (Neb)	5 mg	-
Salbutamol (MDI)	500 mcg	5 x 100 mcg per course; may repeat up to 3 times
Ipratropium (Neb)	250mcg	½ nebule
Ipratropium (MDI)	80 mcg	20mcg x 4 sprays
Magnesium Sulfate (IV infusion)	600 mg	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Details
Defibrillation	24/48 J	2 & 4 J/kg
EPINEPHrine (IV)	0.12 mg (120 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
EPINEPHrine (ETT)	1.2 mg	0.1 mg (100 mcg)/kg; Max 1 0mg
Amiodarone (IV)	60 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	12 mg	1 mg/kg
Lidocaine (ETT)	24 mg	2 mg/kg
Sodium Bicarbonate (IV)	12 mEq	1 mEq/kg; May repeat
Magnesium Sulfate (IV)	600 mg	50 mg/kg; Max 4 g
Calcium Chloride (IV)	240 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	1.2 mg	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	1.2 mg	0.2 mg (200 mcg)/kg; Max 8 mg

Tachycardia

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Details
Adenosine (IV)	1.2/2.4 mg	0.1 & 0.2 mg (100 & 200 mcg)/kg
Amiodarone (IV infusion)	60 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	6/12 J	0.5 & 1.0 J/kg

Bradycardia

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Details
EPINEPHrine (IV)	0.12 mg (120 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes
Atropine (IV)	0.24 mg (240 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); May repeat once
Atropine (ETT)	0.48 mg (480 mcg)	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x5 in 3-5 minutes

Fluid Resuscitation

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Details
Normal Saline	60 mL (240 mL)	5 mL/kg bolus x4; Max 20 mL/kg

Tranexamic Acid

180 mg over 1 minute

Volume of Tranexamic Acid: 1.8 ml

Sedation, Seizure, & Analgesia

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Details
KetAMINE (IN)	18 mg	1.5 mg/kg, Max 50 mg*
KetAMINE (IM)	6 mg	0.5 mg (500 mcg)/kg*
KetAMINE (IV/IO)	3.6 mg	0.3 mg (300 mcg)/kg, Single Dose Max 20 mg, Max Total 0.6 mg (600 mcg)/kg*
MIDAZOLam (IM/IN)	2.4 mg	0.2 mg (200 mcg)/kg; Max 10 mg
MIDAZOLam (IV/IO)	1.2 mg	0.1 mg (100 mcg)/kg; Max 5 mg
FentaNYL (IN)	18 mcg - 24 mcg	1.5-2.0 mcg/kg, Single Dose Max 100 mcg
FentaNYL (IM/IV/IO)	12 mcg - 24 mcg	1-2 mcg/kg, Single Dose Max 50 mcg q 5 min, Max Total 200 mcg
Morphine (IV/IM)	1.2 mg	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM) ***ACP & Above***	15 mg	1.25 mg/kg, Max 5 mg/kg/day or Single dose of 25 mg
Ondansetron (IV)	1.2 mg	0.1 mg (100 mcg)/kg
Ibuprofen (PO)	120 mg	10 mg/kg
Acetaminophen (PO)	180 mg (2.3 mL)	15 mg/kg (80 mg/mL)

*See drug monographs for repeat dosages

Poisoning & Overdose

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Details
Naloxone (IV/IM)	1.2 mg	0.1 mg (100 mcg)/kg; to a maximum of 2 mg/dose. Repeat q 3 mins to effect. No maximum cumulative dose.
Glucagon (IV)	1.2 mg	Beta-blocker overdose 0.1 mg (100 mcg)/kg IV

***Note: Higher doses for naloxone in pediatrics are prescribed as pediatric patients are unlikely to experience withdrawal*

Diabetic

2 Years, 12 kg (26.5 lbs), Broselow Yellow

	Values	Details
Dextrose 10% (D10W)	60 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	0.36 mg (360 mcg)	0.03 mg (30 mcg)/kg; Max 1 mg

Normal Vital Signs

3-4 years

***Weight (KG):** 15-18kg

Weight (Lbs): 33-40

Heart Rate (Beats per minute): 85-132

Respiratory Rate (Breaths per minute): 20-33

Blood Pressure (Systolic Range/ Diastolic Range): 87-112/44-70

MAP (mmHg):58-83

Broselow color: White

* Weight based on Broselow Tape

**Vitals based on BC PEWS

Airway Equipment

3 Years, 15 kg (33 lbs), Broselow White

	Values	Formula
Tidal Volume	90 mL	4-8 mL/kg
Laryngoscope	2 Straight/Curved	-
Un-cuffed ETT	5 mm	(Age/4)+4
Cuffed ETT	4.5 mm	(Age/4)+3
ETT Depth	15 cm	-
i-Gel SGA	Size 2 (grey)	10-25 kg
NPA	20 Fr	-
OPA	60 mm (black)	-
Suction Cath	10 Fr	-

Airway Induction Doses

3 Years, 15 kg (33 lbs), Broselow White

	Values	Details
Normal Saline Bolus (IV)	150 mL	10 mL/kg
ketAMINE (IV/IO)	15 mg	1 mg/kg
EPINEPHrine (Slow IVP/IO)	15 mcg	1.0 mcg/kg
MIDAZOLam (IV/IO)	1.5 mg	0.1 mg (100 mcg)/kg PRN

Maintenance doses on PR18: Anesthesia Induction Page

Respiratory & Allergic Reaction

3 Years, 15 kg (33 lbs), Broselow White

	Values	Details
Dexamethasone (PO/IM/IV)	7.5mg dose = 1.88mL Dexamethasone solution administered	15kg x 0.5mg/kg = 7.5 4mg/mL Dexamethasone supplied
DiphenhydrAMINE (IM/IV)	15 mg	1 mg/kg
EPINEPHrine (IM)	0.15 mg (150 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg)
EPINEPHrine (Neb)	5 mg	0.5 mg (500 mcg)/kg in 5 mL
EPINEPHrine (IV)	0.08 mg (80 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg (300 mcg)
Salbutamol (Neb)	5 mg	-
Salbutamol (MDI)	500 mcg	5 x 100 mcg per course; may repeat up to 3 times
Ipratropium (Neb)	250mcg	½ nebule
Ipratropium (MDI)	80 mcg	20mcg x 4 sprays
Magnesium Sulfate (IV infusion)	750 mg	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

3 Years, 15 kg (33 lbs), Broselow White

	Values	Details
Defibrillation	30/60 J	2 & 4 J/kg
EPINEPHrine (IV)	0.15 mg (150 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
EPINEPHrine (ETT)	1.5 mg	0.1 mg (100 mcg)/kg; Max 10 mg
Amiodarone (IV)	75 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	15 mg	1 mg/kg
Lidocaine (ETT)	30 mg	2 mg/kg
Sodium Bicarbonate (IV)	15 mEq	1 mEq/kg; May repeat
Magnesium Sulfate (IV)	750 mg	50 mg/kg; Max 4 g
Calcium Chloride (IV)	300 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	1.5 mg	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	1.5 mg	0.2 mg (200 mcg)/kg; Max 8 mg

Tachycardia

3 Years, 15 kg (33 lbs), Broselow White

	Values	Details
Adenosine (IV)	1.5/3.0 mg	0.1 & 0.2 mg (100 & 200 mcg)/kg
Amiodarone (IV infusion)	75 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	8/15 J	0.5 & 1.0 J/kg

Bradycardia

3 Years, 15 kg (33 lbs), Broselow White

	Values	Details
EPINEPHrine (IV)	0.15 mg (150 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes
Atropine (IV)	0.3 mg (300 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); May repeat once
Atropine (ETT)	0.6 mg (600 mcg)	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x5 in 3-5 minutes

Fluid Resuscitation

3 Years, 15 kg (33 lbs), Broselow White

	Values	Details
Normal Saline	75 mL (300 mL)	5 mL/kg bolus x4; (Max 20 mL/kg)

Tranexamic Acid

225 mg over 1 minute

Volume of Tranexamic Acid: 2.25 ml

Sedation, Seizure, & Analgesia

3 Years, 15 kg (33 lbs) Broselow White

	Values	Details
KetAMINE (IN)	22.5 mg	1.5 mg/kg, Max 50 mg *
KetAMINE (IM)	7.5 mg	0.5 mg (500 mcg)/kg *
KetAMINE (IV/IO)	4.5 mg	0.3 mg (300 mcg)/kg, Single Dose Max 20 mg, Max Total 0.6 mg (600 mcg)/kg *
MiIDAZOLam (IM/IN)	3.0 mg	0.2 mg (200 mcg)/kg; Max 10 mg
MIDAZOLam (IV/IO)	1.5 mg	0.1 mg (100 mcg)/kg; Max 5 mg
FentaNYL (IN)	22.5 mcg - 30 mcg	1.5-2.0 mcg/kg, Single Dose Max 100 mcg
FentaNYL (IM/IV/IO)	15 mcg - 30 mcg	1-2 mcg/kg, Single Dose Max 50 mcg q 5 min, Max Total 200 mcg
Morphine (IV/IM)	1.5 mg	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM) *ACP & Above*	18.75 mg	1.25 mg/kg, Max 5 mg/kg/day or Single dose of 25 mg
Ondansetron (IV)	1.5 mg	0.1 mg (100 mcg)/kg
Ibuprofen (PO)	150 mg	10 mg/kg
Acetaminophen (PO)	225 mg (2.8 mL)	15 mg/kg (80 mg/mL)

*See drug monographs for repeat dosages

Poisoning & Overdose

3 Years, 15 kg (33 lbs), Broselow White

	Values	Details
Naloxone (IV/IM)	1.5 mg	0.1 mg (100 mcg)/kg; to a maximum of 2 mg/dose. Repeat q 3 mins to effect. No maximum cumulative dose.
Glucagon (IV)	1.5 mg	Beta-blocker overdose 0.1 mg (100 mcg)/kg IV

***Note: Higher doses for naloxone in pediatrics are prescribed as pediatric patients are unlikely to experience withdrawal*

Diabetic

3 Years, 15 kg (33 lbs), Broselow White

	Values	Details
Dextrose 10% (D10W)	75 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	0.45 mg (450 mcg)	0.03 mg (30 mcg)/kg; Max 1 mg

Normal Vital Signs

5-6 years

***Weight (KG):** 19-23kg

Weight (Lbs): 41.9-50.7

Heart Rate (Beats per minute): 66-120

Respiratory Rate (Breaths per minute): 16-30

Blood Pressure (Systolic Range/ Diastolic Range): 94-118/52-78

MAP (mmHg): 66-87

Broselow color: Blue

* Weight based on Broselow Tape

**Vitals based on BC PEWS

Airway Equipment

5 Years, 21 kg (46.2 lbs), Broselow Blue

	Values	Formula
Tidal Volume	104-168 mL	4-8 mL/kg
Laryngoscope	2 Straight/Curved	-
Un-cuffed ETT	5.5 mm	(Age/4)+4
Cuffed ETT	5.0 mm	(Age/4)+3
ETT Depth	16.5 cm	-
i-Gel SGA	Size 2 (grey)	10-25 kg
NPA	24 Fr	-
OPA	70 mm (white)	-
Suction Cath	10 Fr	-

Airway Induction Doses

5 Years, 21 kg (46.2), Broselow Blue

	Values	Details
Normal Saline Bolus (IV)	210 mL	10 ml/kg
ketAMINE (IV/IO)	21 mg	1 mg/kg
EPINEPHrine (Slow IVP/IO)	21 mcg	1.0 mcg/kg
MIDAZOLam (IV/IO)	2.1 mg	0.1 mg (100 mcg)/kg PRN

Maintenance doses on PR18: Anesthesia Induction Page

Respiratory & Allergic Reaction

5 Years, 21 kg (46.2 lbs), Broselow Blue

	Values	Details
Dexamethasone (PO/IM/IV)	10.5mg Dose = 2.63mL Dexamethasone Solution	21kg x 0.5mg/kg = 10.5mg Dose Supplied Dexamethasone 4mg/ml
DiphenhydrAMINE (IM/IV)	21 mg	1 mg/kg
EPINEPHrine (IM)	0.21 mg (210 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg)
EPINEPHrine (Neb)	5 mg	5mgin 5 ml dose
EPINEPHrine (IV)	0.105 mg (105 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg (300 mcg)
Ipratropium (Neb)	250mcg	½ nebule
Ipratropium (MDI)	80 mcg	20 mcg x 4
Salbutamol (Neb)	5 mg	
Salbutamol (MDI)	1000 mcg	10 x 100 mcg per course; may repeat up to 3 times
Magnesium Sulfate (IV infusion)	1,050 mg	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

5 Years, 21 kg (46.2 lbs), Broselow Blue

	Values	Details
Defibrillation	42/84 J	2 & 4 J/kg
EPINEPHrine (IV)	0.21 mg (210 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
EPINEPHrine (ETT)	2.1 mg	0.1 mg (100 mcg)/kg; Max 10 mg
Amiodarone (IV)	105 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	21 mg	1 mg/kg
Lidocaine (ETT)	42 mg	2 mg/kg
Sodium Bicarbonate (IV)	21 mEq	1 mEq/kg; May repeat
Magnesium Sulfate (IV)	1,050 mg	50 mg/kg; Max 4 g
Calcium Chloride (IV)	420 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	2.1 mg	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	4.2 mg	0.2 mg (200 mcg)/kg; Max 8 mg

Tachycardia

5 Years, 21 kg (46.2 lbs), Broselow Blue

	Values	Details
Adenosine (IV)	2.1/4.2 mg	0.1 & 0.2 mg (100 & 200 mcg)/kg
Amiodarone (IV infusion)	105 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	11/20 J	0.5 & 1.0 J/kg

Bradycardia

5 Years, 21 kg (46.2 lbs), Broselow Blue

	Values	Details
EPINEPHrine (IV)	0.21mg (210 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes.
Atropine (IV)	0.42 mg (420 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); May repeat once
Atropine (ETT)	0.84 mg (840 mcg)	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x5 in 3-5 minutes

Fluid Resuscitation

5 Years, 21 kg (46.2 lbs), Broselow Blue

	Values	Details
Normal Saline	105 mL (420 mL)	5 mL/kg bolus x4; (Max 20 mL/kg)

Tranexamic Acid

315 mg over 1 minute

Volume of Tranexamic Acid: 3.1 ml

Sedation, Seizure, & Analgesia

5 Years, 21 kg (46.2 lbs), Broselow Blue

	Values	Details
KetAMINE (IN)	31.5 mg	1.5 mg/kg, Max 50 mg *
KetAMINE (IM)	10.5 mg	0.5 mg (500 mcg)/kg *
KetAMINE (IV/IO)	6.3 mg	0.3 mg (300 mcg)/kg, Single Dose Max 20 mg, Max Total 0.6 mg (600 mcg)/kg *
MIDAZOLam (IM/IN)	4.2 mg	0.2 mg (200 mcg)/kg; Max 10 mg
MIDAZOLam (IV/IO)	1.8 mg	0.1 mg (100 mcg)/kg; Max 5 mg
FentaNYL (IN)	31.5mcg-42mcg	1.5-2.0 mcg/kg, Single Dose Max 100 mcg
FentaNYL (IM/IV/IO)	21 mcg - 42 mcg	1-2 mcg/kg, Single Dose Max 50 mcg q 5 min, Max Total 200 mcg
Morphine (IV/IM)	2.1 mg	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM) ***ACP & Above***	26.25 mg	1.25 mg/kg, Max 5 mg/kg/day or Single dose of 25 mg
Ondansetron (IV)	2.1 mg	0.1 mg (100 mcg)/kg
Ibuprofen (PO)	210 mg	10 mg/kg
Acetaminophen (PO)	315 mg (4 mL)	15 mg/kg (80 mg/mL)

*See drug monographs for repeat dosages

Poisoning & Overdose

5 Years, 21 kg (46.2 lbs), Broselow Blue

	Values	**Details**
Naloxone (IV/IM)	2.0 mg	0.1 mg (100 mcg)/kg; to a maximum of 2 mg/dose. Repeat q 3 mins to effect. No maximum cumulative dose.
Glucagon (IV)	2.1 mg	Beta-blocker overdose 0.1 mg (100 mcg)/kg IV

***Note: Higher doses for naloxone in pediatrics are prescribed as pediatric patients are unlikely to experience withdrawal*

Diabetic

5 Years, 21 kg (46.2 lbs), Broselow Blue

	Values	Details
Dextrose 10% (D10W)	105 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	0.63 mg (630 mcg)	0.03 mg (30 mcg)/kg; Max 1 mg

Normal Vital Signs

7-9 years

***Weight (KG):** 24-29kg

Weight (Lbs): 52.9-63.9

Heart Rate (Beats per minute): 60-120

Respiratory Rate (Breaths per minute): 16-30

Blood Pressure (Systolic Range/ Diastolic Range): 96-118/ 53-76

MAP (mmHg): 70-90

Broselow color: Orange

* Weight based on Broselow Tape

**Vitals based on BC PEWS

Airway Equipment

8 Years, 25 kg (55.1 lbs), Broselow Orange

	Values	Formula
Tidal Volume	150 mL	4-8 mL/kg
Laryngoscope	2-3 Straight/Curved	-
Un-cuffed ETT	6 mm	(Age/4)+4
Cuffed ETT	5.5 m	(Age/4)+3
ETT Depth	18 cm	-
i-Gel SGA	Size 2.5 (white)	25-35 kg
NPA	26 Fr	-
OPA	80 mm (green)	-
Suction Cath	10-12 Fr	-

Airway Induction Doses

8 Years, 25kg (55.12lbs), Broselow Orange

	Values	Details
Normal Saline Bolus (IV)	250ml	10ml/kg
ketAMINE (IV/IO)	25mg	1mg/kg
EPINEPHrine (Slow IVP/IO)	25mcg	1.0mcg/kg
MIDAZOLam (IV/IO)	2.5mg	0.1mg (100 mcg)/kg PRN

Maintenance doses on PR18: Anesthesia Induction Page

Respiratory & Allergic Reaction

8 Years, 25 kg (55.1 lbs), Broselow Orange

	Values	Details
Dexamethasone (PO/IM/IV)	12.5mg Dose = 3.13mL Dexamethasone solution administered	25 x 0.5mg/kg=12.5mg 4mg/ml Supplied Dexamethasone
DiphenhydrAMINE (IM/IV)	25 mg	1 mg/kg
EPINEPHrine (IM)	0.25 mg (250 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg)
EPINEPHrine (Neb)	5 mg	5mg dose
EPINEPHrine (IV)	0.12 mg (120 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg (300 mcg)
Salbutamol (Neb)	5 mg	-
Salbutamol (MDI)	1000 mcg	10 x 100 mcg per course, May repeat up to 3x
Ipratropium (Neb)	250 mcg	½ nebule
Ipratropium (MDI)	80 mcg	20mcg x 4 sprays
Magnesium Sulfate (IV infusion)	1.2 g	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

8 Years, 25 kg (55.1 lbs), Broselow Orange

	Values	Details
Defibrillation	50/100 J	2 & 4 J/kg
EPINEPHrine (IV)	0.25 mg (250 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
EPINEPHrine (ETT)	2.5 mg	0.1 mg (100 mcg)/kg; Max 10 mg
Amiodarone (IV)	125 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	25 mg	1 mg/kg
Lidocaine (ETT)	50 mg	2 mg/kg
Sodium Bicarbonate (IV)	25 mEq	1 mEq/kg; May repeat
Magnesium Sulfate (IV)	1.2 g	50 mg/kg; Max 4 g
Calcium Chloride (IV)	500 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	2.5 g	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	5 mg	0.2 mg (200 mcg)/kg; Max 8 mg

Tachycardia

8 Years, 25 kg (55.1 lbs), Broselow Orange

	Values	Details
Adenosine (IV)	2.5/5.0 mg	0.1 & 0.2 mg (100 & 200 mcg)/kg
Amiodarone (IV infusion)	125 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	12/25 J	0.5 & 1.0 J/kg

Bradycardia

8 Years, 25 kg (55.1 lbs), Broselow Orange

	Values	Details
EPINEPHrine (IV)	0.25 mg	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes.
Atropine (IV)	0.5 mg (500 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); May repeat once
Atropine (ETT)	1.0 mg	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x 5 in 3-5 minutes

Fluid Resuscitation

8 Years, 25 kg (55.1 lbs), Broselow Orange

	Values	Details
Normal Saline	125 mL (500 mL)	5 mL/kg bolus x4; Max 20 mL/kg

Tranexamic Acid

375 mg over 1 minute

Volume of Tranexamic Acid: 3.75 ml

Sedation, Seizure, & Analgesia

8 Years, 25 kg (55.1 lbs), Broselow Orange

	Values	Details
KetAMINE (IN)	37.5 mg	1.5 mg/kg, Max 50 mg *
KetAMINE (IM)	12.5 mg	0.5 mg (500 mcg)/kg *
KetAMINE (IV/IO)	7.5 mg	0.3 mg (300 mcg)/kg, Single Dose Max 20 mg, Max Total 0.6 mg (600 mcg)/kg *
MIDAZOLam (IM/IN)	5.0 mg	0.2 mg (200 mcg)/kg; Max 10 mg
MIDAZOLam (IV/IO)	2.5 mg	0.1 mg (100 mcg)/kg; Max 5 mg
FentaNYL (IN)	37.5 mcg - 50 mcg	1.5-2 mcg/kg, Single Dose Max 100 mcg
FentaNYL (IM/IV/IO)	25 mcg - 50 mcg	1-2 mcg/kg, Single Dose Max 50 mcg q 5 min, Max Total 200 mcg
Morphine (IV/IM)	2.5 mg	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM) ***ACP & Above***	25 mg	1.25 mg/kg, Max single dose of 25 mg or Max 5 mg/kg/day
Ondansetron (IV)	2.5 mg	0.1 mg (100 mcg)/kg
Ibuprofen (PO)	250 mg	10 mg/kg
Acetaminophen (PO)	375 mg (4.7 mL)	15 mg/kg (80 mg/mL)

*See drug monographs for repeat dosages

Poisoning & Overdose

8 Years, 25 kg (55.1 lbs), Broselow Orange

	Values	Details
Naloxone (IV/IM)	2 mg	0.1 mg (100 mcg)/kg; to a maximum of 2 mg/dose. Repeat q 3 mins to effect. No maximum cumulative dose.
Glucagon (IV)	2.5 mg	Beta-blocker overdose 0.1 mg (100 mcg)/kg IV

Diabetic

8 Years, 25 kg (55.1 lbs), Broselow Orange

	Values	Details
Dextrose 10% (D10W)	125 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	0.75 mg (750 mcg)	0.03 mg (30 mcg)/kg; Max 1 mg

Normal Vital Signs

10-11 years

***Weight (KG):** 30-36kg

Weight (Lbs): 66.1-79.3

Heart Rate (Beats per minute): 60-110

Respiratory Rate (Breaths per minute): 15-29

Blood Pressure (Systolic Range/ Diastolic Range): 100-121/ 60-80

MAP (mmHg): 72-94

Broselow color: Green

*Weight based on Broselow tape

** Vital approxmiations based on BC PEWS

Airway Equipment

12 Years, 40 kg (88.2 lbs)

	Values	Formula
Tidal Volume	240 mL	4-8 mL/kg
Laryngoscope	3 Straight/Curved	-
Un-cuffed ETT	6.5 mm	(Age/4)+4
Cuffed ETT	6 mm	(Age/4)+3
ETT Depth	19.5 cm	-
i-Gel SGA	Size 3 (yellow)	30-60 kg
NPA	28-30 Fr	-
OPA	80 mm (green)	-
Suction Cath	12-14 Fr	-

Airway Induction Doses

12 Years, 40 kg (88.2 lbs)

	Values	Details
Normal Saline Bolus (IV)	400 mL	10 mL/kg
ketAMINE (IV/IO)	40 mg	1 mg/kg
EPINEPHrine (Slow IVP/IO)	40 mcg	1 mcg/kg
MIDAZOLam (IV/IO)	4 mg	0.1 mg (100 mcg)/kg PRN

Maintenance doses on PR18: Anesthesia Induction Page

Respiratory & Allergic Reaction

12 Years, 40 kg (88.2 lbs)

	Values	Details
Dexamethasone (PO/IM/IV)	16mg dose = 4.00mL Dexamethasone solution administered	40kg x0.5mg/kg 4mg/ml Dexamethasone solution supplied
DiphenhydrAMINE (IM/IV)	40 mg	1 mg/kg
Epinephrine (IM)	0.4 mg (400 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg)
Epinephrine (Neb)	5 mg	5 mg
Epinephrine (IV)	0.2 mg (200 mcg)	0.005 mg (5 mcg)/kg; Max 0.3 mg (300 mcg)
Salbutamol (Neb)	5 mg	-
Salbutamol (MDI)	1000 mcg	10 x 100 mcg per course, May repeat up to 3x
Ipratropium (Neb)	250mcg	½ nebule
Ipratropium (MDI)	80mcg	20mcg x 4 sprays
Magnesium Sulfate (IV infusion)	2 g	50 mg/kg over 20 minutes; Max 2 g

Cardiac Arrest

12 Years, 40 kg (88.2 lbs)

	Values	Details
Defibrillation	80/160 J	2 & 4 J/kg
EPINEPHrine (IV)	0.4 mg (400 mcg)	0.01 mg (10 mcg)/kg; Max 1 mg
EPINEPHrine (ETT)	4 mg	0.1 mg (100 mcg)/kg; Max 10 mg
Amiodarone (IV)	150 mg	5 mg/kg; Max 300 mg
Lidocaine (IV)	40 mg	1 mg/kg
Lidocaine (ETT)	80 mg	2 mg/kg
Sodium Bicarbonate (IV)	40 mEq	1 mEq/kg; May repeat
Magnesium Sulfate (IV)	2 g	50 mg/kg; Max 4 g
Calcium Chloride (IV)	500 mg	20 mg/kg; Max 500 mg
Naloxone (IV)	4 mg	0.1 mg (100 mcg)/kg; Max 4 mg
Naloxone (ETT)	8 mg	0.2 mg (200 mcg)/kg; Max 8 mg

Tachycardia

12 Years, 40 kg (88.2 lbs)

	Values	Details
Adenosine (IV)	4/8 mg	0.1 & 0.2 mg (100 & 200 mcg)/kg
Amiodarone (IV infusion)	150 mg	5 mg/kg over 20 minutes; May repeat x2; Max 300 mg
Cardioversion	20/40 J	0.5 & 1.0 J/kg

Bradycardia

12 Years, 40 kg (88.2 lbs)

	Values	Details
EPINEPHrine (IV)	0.4 mg (400 mcg)	0.01 mg (10 mcg)/kg; Max 0.5 mg (500 mcg); q 3-5 minutes
Atropine (IV)	0.6 mg (600 mcg)	0.02 mg (20 mcg)/kg; Max single dose 0.6 mg (600 mcg); May repeat once
Atropine (ETT)	1.2 mg	0.04 mg (40 mcg)/kg; Max single dose 1.2 mg; Max total dose 6 mg; May repeat x5 in 3-5 minutes

Fluid Resuscitation

12 Years, 40 kg (88.2 lbs)

	Values	Details
Normal Saline	200 mL (800 mL)	5 mL/kg bolus x4; Max 20 mL/kg

Tranexamic Acid

2 g over 1 minute

Volume of Tranexamic Acid: 20 ml

Sedation, Seizure, & Analgesia

12 Years, 40 kg (88.2 lbs)

	Values	Details
KetAMINE (IN)	50 mg	1.5 mg/kg, Max 50 mg*
KetAMINE (IM)	20 mg	0.5 mg (500 mcg)/kg*
KetAMINE (IV/IO)	12 mg	0.3 mg (300 mcg)/kg, Single Dose Max 20 mg, Max Total 0.6 mg (600 mcg)/kg *
MIDAZOLam (IM/IN)	8 mg	0.2 mg (200 mcg)/kg; Max 10 mg
MIDAZOLam (IV/IO)	4 mg	0.1 mg (100 mcg)/kg; Max 5 mg
FentaNYL (IN)	60 mcg - 80 mcg	1.5-2 mcg/kg, Single Dose Max 100 mcg
FentaNYL (IM/IV/IO)	40 mcg - 50 mcg	1-2 mcg/kg, Single Dose Max 50 mcg q 5 min, Max Total 200 mcg
Morphine (IV/IM)	4 mg	0.1 mg (100 mcg)/kg
DimenhyDRINATE (IV/IM) ***PCP & Above***	25 mg	1.25 mg/kg, Max single dose of 25 mg or Max 5 mg/kg/day
Ondansetron (IV)	4 mg	0.1 mg (100 mcg)/kg
Ibuprofen (PO)	300 mg	10 mg/kg
Acetaminophen (PO)	600 mg (7.5 mL)	15 mg/kg (80 mg/mL)

*See drug monographs for repeat dosages

Poisoning & Overdose

12 Years, 40 kg (88.2 lbs)

	Values	Details
Naloxone (IV/IM)	2 mg	0.1 mg (100 mcg)/kg; to a maximum of 2 mg/dose. Repeat q 3 mins to effect. No maximum cumulative dose.
Glucagon (IV)	4 mg	Beta-blocker overdose 0.1 mg (100 mcg)/kg IV

***Note: Higher doses for naloxone in pediatrics are prescribed as pediatric patients are unlikely to experience withdrawal*

Diabetic

12 Years, 40 kg (88.2 lbs)

	Values	Details
Dextrose 10% (D10W)	200 mL	5 mL/kg; May be repeated
Glucagon (SC/IM)	1 mg	0.03 mg (30 mcg)/kg; Max 1 mg

BC PEWS Vital Signs Reference Card

Age	Heart Rate Beats per minute	Respiratory Rate Breaths per minute	Systolic / Diastolic BP	MAP mmHg
0 – 28 days*	104 – 162	31 – 60	60 – 80 / 30 – 53	40 or higher
1 – 3 months*	104 – 162	31 – 60	73 – 105 / 36 – 68	48 or higher
4 – 11 months*	109 – 159	29 – 53	82 – 105 / 46 – 68	58 – 80
1 – 3 years†	89 – 139	25 – 39	85 – 109 / 37 – 67	53 – 81
4 – 6 years†	71 – 128	17 – 31	91 – 114 / 50 – 74	63 – 87
7 – 11 years†	60 – 114	15 – 28	96 – 121 / 57 – 80	70 – 94
12 plus years†	50 – 104	12 – 25	105 – 136 / 62 – 87	76 – 103
Temperature °C	**Oral:** 35.5 – 37.5, **Axilla:** 36.5 – 37.5, **Rectal:** 36.6 – 38.0, **Temporal:** 36.3 – 37.8			

HR and RR ranges: CTAS 2013
Temperature ranges: CPS 2015
BP ranges: *Modified from American Heart Association (2012). *Pediatric emergency assessment, recognition, and stabilization (PEARS) provider manual.*† National Heart, Lung and Blood Pressure Institute (2004). The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics, 114(2)*, 555-556.

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BC PEWS Vital Signs Reference Card

Body Weight (kg)	Fluid Requirements Per Day
Below 10 kg	100 mL per kg
10 – 20 kg	1000 mL + 50 mL per kg over 10 kg
Greater than 20 kg	1500 mL + 20 mL per kg over 20 kg
Body Weight (kg)	**Fluid Requirements Per Hour**
Below 10 kg	4 mL per kg
10 – 20 kg	2 mL per kg for each kg greater than 10 kg
Greater than 20 kg	1 mL per kg for each kg greater than 20 kg
Urine Output	**0.5 – 1.0 mL per kg per hr**

Pickard, G. & Abernathy, A.P. (2013). *Dosage calculations, Ninth edition.* Delmar, Cengage Learning.

PHSA331 Jan.2016

BCEHS Adoption of BC Pediatric Early Warning Systems

Pediatric Early Warning Systems (PEWS) are used internationally to promote early identification and mitigation of deterioration in hospitalized pediatric patients. BC health authority leaders and clinicians have identified the implementation of PEWS as a high priority in hospitals that care for children across sites at all Tiers of Service.

The Child Health BC Steering Committee endorsed a standardized approach to the development, implementation and evaluation of PEWS in BC hospitals (BC PEWS) .
BC PEWS is a five-component system that provides a standardized framework and language to identify potential deterioration in a child, mitigate the risk and escalate care as needed as early as possible.

Child Health BC in collaboration with the BC Regional Health Authorities, have become the first jurisdiction in North America to adapt a province-wide standardized early warning system for pediatrics. To date:

- 50 hospitals have implemented BC PEWS in their inpatient units.
- 97 hospitals/health centers & 7 First Nations Health Authority Nursing Outposts have implemented BC PEWS ED in their Emergency Departments
- The inpatient implementation was comprehensively evaluated after one year, showing positive outcomes overall with some opportunity for further development.
- A research pilot at Richmond Hospital Emergency Department (ED) demonstrated the potential value of using PEWS in the ED and has been published in BMC Emergency Medicine.

References

ChildhealthBC. (2023). Pediatric early warning system (PEWS). CHBC. https://www.childhealthbc.ca/initiatives/pediatric-early-warning-system-pews

M00: Pediatrics - General

Heather Rose and Ryan Casselman

Updated: December 25, 2023
Reviewed: March 01, 2021

Introduction

This comprehensive guideline is designed to equip BCEHS employees with the knowledge necessary to recognize and address the unique needs of pediatric patients. It acknowledges the critical importance of tailoring medical management to the specific physiological parameters of different age groups and provides in-depth information on the distinct anatomical structures, physiological functions, and developmental factors that paramedics must consider when assessing and treating pediatric patients within the prehospital realm.

By gaining understanding of both the commonalities and variations between adult and pediatric patients, paramedics will be better prepared to deliver care that is safe, effective, and compassionate to patients across the entire age spectrum. This readiness extends to routine medical situations as well as critical emergencies, ensuring that optimal outcomes are achieved.

Essentials

For clinical consideration within BCEHS, pediatric patients are those who are **≤ 12 years of age,** whereas adults are defined as **> 12 years of age or showing signs of puberty.** There is widespread variation on this definition across BC health authorities. This does not apply to matters of consent.

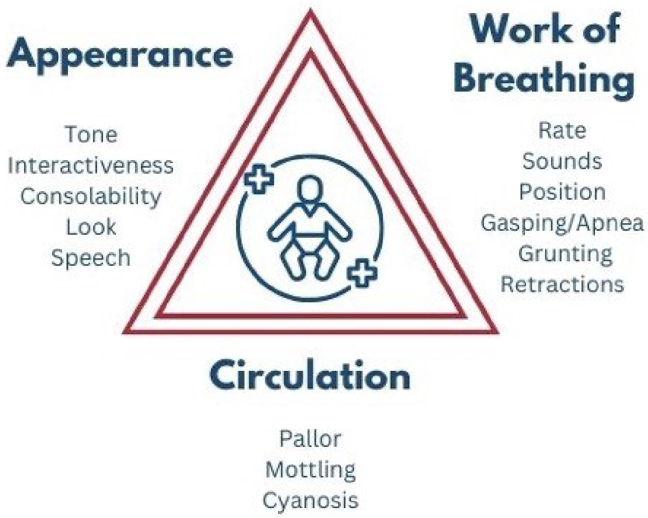
Children differ anatomically and physiologically in comparison to adults in a number of ways. The table below highlights so of the key distinctions:

Anatomical and Physiological Differences	**Implications for the Pediatric Patient**
Children have a larger head and trunk compared to the rest of their body	More susceptible to heat and fluid loss
Children have small and narrow airways, larger tongues, shorter tracheas, more elastic cartilage, and are obligate nose breathers for the first 2-4 months of life	Increased risk of airway obstruction and ineffective oxygenation in the event of respiratory illness
Children have an increased metabolic rate and increased fluid requirements, as a greater percentage of their body weight is water	Require more energy and consumer more oxygen to sustain their basal metabolic rate, and in cases of decreased oxygenation or decreased intravascular volume, they can dehydrate and deteriorate quickly
Children have an underdeveloped nervous system response such as shivering, vasoconstriction, and the ability to sweat. Infants under 6 months cannot shiver, and rely on brown fat metabolism to generate heat.	Unstable temperature control requires close monitoring to ensure that normothermia can be maintained. Children can get cold quickly when exposed for examinations or procedures.

General Information

BCEHS | BC Emergency Health Services
Provincial Health Services Authority

Pediatric Assessment Triangle



General Appearance: "Tickles" TICLS

When assessing the patient's general appearance, remember the mnemonic TICLS, which stands for **Tone, Interactiveness, Consolability, Look and Speech**.

- **Tone:** Muscle tone. Is the patient demonstrating independent, voluntary movement of all four extremities? Or are they laying limp/flaccid? When an extremity is touched, how do they respond? Are they quick to pull away or tense the arm/leg? Or do they let it drop heavily back to the original position?
  - Overarching question: **Is the child moving appropriately, or are they floppy or listless?**
- **Interactive:** This component will vary greatly depending on age of the child. Pediatric patients 1 to 5 months interact by opening their eyes, moving their arms and legs, or crying when they are unhappy. By 6 months of age, they can smile, and grab onto things you present in front of them. By 8 months, children are usually learning how to crawl, and can sit up independently.
  - Overarching question: **How alert is the child?**
- **Consolability**: Can the parent calm the patient as they usually do, or are they unable to help them regulate? Children ages 3-5 may have difficulty communicating when they are in pain or discomfort, and their caregivers may be the best source of information about their normal behaviour versus their current response. Does the child respond the same to your presence as a stranger as they do to the comfort of their caregiver?
  - Overarching Question: **Does the child settle like they usually would?**
- **Look/Gaze:** Do they make eye contact? Are their eyes tracking or vacant stares? Do their eyes stay closed? Does the child look to the caregiver? Did they notice you enter the room?
  - Overarching Question: **How does the child visually observe the environment?**
- **Speech**/**Cry**: Are they attempting to speak? Sick children may be unable to express themselves. Crying again can be a good sign! It safeguards the practitioner that the patient has an open airway and is effectively breathing. Note any abnormal sounds to the cry. Is there a high pitcher wheeze present? Is there a barking-like cough?
  - Overarching Question: **Does the child speak/cry as usual, or is something unusual?**

Final general impression question: *Is there anything concerning in the appearance of the child?*

Work of Breathing

Children's breathing should be noiseless, effortless, and painless.

Observing changes in respirations should be made before further assessment to avoid causing the child to become upset and changing their respiratory efforts from baseline. Changes in pediatric respirations are much more subtle than in adults and may require close attention to distinguish. This will require removing the shirt or lifting it to assess adequately. Note the rate, rhythm, and depth of respirations. Notice any patterns. Children up to 5 are belly breathers - meaning they utilize their stomach muscles with inhalation. This will cause their abdomen to protrude with inhalation and retract with exhalation.

※ **Pearl:** From a distance, you can ask the caregiver to assist you in your assessment by lifting or removing the child's clothing, if appropriate. The "doorway" respiratory assessment performed as part of the PAT can yield valuable information, informing the practitioner on possible aetiologies associated with specific abnormal breathing patterns and sounds.

Respiratory patterns

Quick, shallow breaths accompanied by extended exhalation are commonly observed in cases of air trapping, such as those seen in conditions like asthma, bronchiolitis, or when a foreign object obstructs the airway beyond the carina. This breathing pattern can also occur due to chest or abdominal discomfort or dysfunction in the chest wall.

Other concerning breathing patterns include:

- Kussmaul respirations (rapid and deep breathing pattern potentially indicating metabolic acidosis)
- Cheyne-Stokes or ataxic respirations (variable rates of breathing associated with periods of apnea can be indicative of CNS damage or injury)
- Paradoxical breathing (chest collapses on inspiration and abdomen is pushed outward, can be a sign of fatigue or muscle weakness)

Please review this video for further information on these breathing patterns.

Accessory muscle use

- Nasal flaring: exaggerated opening of the nostrils during inspiration, is a subtle form of severe accessory muscle use
- Head bobbing: extension of the head and neck during inhalation and falling forward of the head during exhalation, is most likely to be seen in infants and can be easily overlooked
- Chest wall muscle retractions and abnormal movement: muscles surrounding the ribs, sternum and clavicle retract inward due to high intrathoracic negative pressure generated by increased respiratory effort Look at the child's chest. Notice any indrawing between the rib spaces, around the trachea (tracheal tugging) or directly underneath the diaphragm.

- Abdominal breathing: Characterized by thoracoabdominal dissociation, in which the chest collapses, and the abdomen protrudes on inspiration, may be normal in infants, but, beyond infancy or in patients with poor muscle tone, is concerning for respiratory muscle fatigue.

Please review this video for more information and examples

Final breathing question: *Are you concerned about their breathing?*

Circulation

Evaluating the adequacy of systemic blood flow is a critical element of pediatric patient care. Pediatric patients communicate valuable information about their circulatory health through the condition of their skin. In healthy children, the skin presents with a natural color and feels dry and comfortably warm. Any deviation from this normal state should immediately catch the attention of healthcare providers. It is crucial to consider the child's ethnic background and the lighting conditions in the environment when assessing the child's skin.

During the PAT, pay close attention to a patient's circulation to the skin. When approaching the child, note the general appearance of their skin.

- Are they pale/white in appearance?
- Are they red/flushed?
- Do they appear to have a grey/blueish tone (cyanosis) to their skin?

Consider asking the parent or primary caregiver: Does the child look their usual colour?

Pallor: Paler than normal. Pallor can be a sign of anemia, hypothermia or hypoperfusion.

MOTTLING = RED FLAG FOR HYPOPERFUSION

Cyanosis: Blueish discoloration of skin. Predominant around lips. Cyanosis may indicate hypoxia, a lack of oxygen.

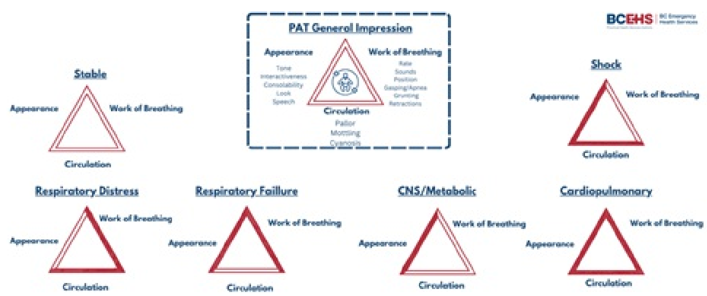
CYANOISIS = RED FLAG FOR HYPOXIA

Lightly press down on the nailbed using a finger or toe (which may be preferred in children). How long does it take to return to baseline colour? 1 second? 2 seconds? Anything over 2 seconds can be a sign of decreased perfusion.

Lightly pulling a section of skin on the hand or chest, does it snap back into place quickly? Or does it "tent" and return slowly? This can be a great sign of hydration/dehydration.

Are there any rashes present? If so, where are they located, and how would you describe them?

Final breathing question: **Are you concerned about their circulatory state?**



Pediatric Early Warning System

Efficiently conveying and documenting potential signs of illness in a child, as indicated by the Pediatric Assessment Tool (PAT), is of utmost importance.

Internationally, Pediatric Early Warning Systems (PEWS) play a vital role in proactively recognizing and addressing deteriorating health conditions in pediatric patients who are admitted to hospitals. “The PEWS provides evidence-informed methods to assess children in different age groups, using vital signs parameters and risk indicators supported by evidence to be reliable indicators of deterioration” (Child Health BC, 2023). Leaders and healthcare practitioners within the British Columbia (BC) health authorities have recognized the critical need for the widespread adoption of PEWS in healthcare facilities catering to children across various service tiers. This includes extending its implementation to BCEHS. Using the PEWS early warning score, along with the PEWS vital signs reference card will align BCEHS practices with the rest of the healthcare team and minimize margins for error.

BC PEWS Vital Signs Reference Card

Age	Heart Rate Beats per minute	Respiratory Rate Breaths per minute	Systolic / Diastolic BP	MAP mmHg
0 – 28 days*	104 – 162	31 – 60	60 – 80 / 30 – 53	40 or higher
1 – 3 months*	104 – 162	31 – 60	73 – 105 / 36 – 68	48 or higher
4 – 11 months*	109 – 159	29 – 53	82 – 105 / 46 – 68	58 – 80
1 – 3 years†	89 – 139	25 – 39	85 – 109 / 37 – 67	53 – 81
4 – 6 years†	71 – 128	17 – 31	91 – 114 / 50 – 74	63 – 87
7 – 11 years†	60 – 114	15 – 28	96 – 121 / 57 – 80	70 – 94
12 plus years†	50 – 104	12 – 25	105 – 136 / 62 – 87	76 – 103
Temperature °C	**Oral:** 35.5 – 37.5, **Axilla:** 36.5 – 37.5, **Rectal:** 36.6 – 38.0, **Temporal:** 36.3 – 37.8			

HR and RR ranges: CTAS 2013
Temperature ranges: CPS 2015
BP ranges: *Modified from American Heart Association (2012). *Pediatric emergency assessment, recognition, and stabilization (PEARS) provider manual.* † National Heart, Lung and Blood Pressure Institute (2004). The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics, 114(2)*, 555-556.

CHILD HEALTH BC
LEAD BENEFACTOR
save on foods

BCEHS paramedics should have awareness of the factors associated with the risk of pediatric clinical deterioration. For PEWS this consists of 5 risk factors: Patient/Family/Caregiver Concern, Watcher Patient, Communication Breakdown, Unusual Therapy, and PEWS Score 2 or higher. (Childhealth BC, 2023).

Calculating Weight

Weight based dosing

It is recommended to use the following methods in order of most accurate to least accurate:

1. Parent or primary caregiver estimation is most accurate (within 10 percent of actual body weight approximately 80 percent of the time
2. Use of length-based measurements (eg, Broselow, Handtevy, PAWPER, or Mercy tapes)” (Fuchs, 2023) . For example, the Broselow tape provided a weight estimate within 10 percent of actual weight 54 percent of the time
3. Age-based methods can be used but will often be highly inaccurate. We recommend using the following formula for patients aged 1 to 10 years: Weight (kg) = 2x(age in years)+8

M01: Pediatrics - Cardiac Emergencies

Heather Rose and Ryan Casselman

Updated: October 24, 2023
Reviewed: October 24, 2023

Introduction

In the pediatric population, cardiac emergencies originating from the cardiac system are much less frequent than in adults. Cardiac chief complaints stem predominantly from respiratory causes or other systems in the body being out of homeostasis, creating a secondary cardiac issue. The exception to these cases is pediatric patients with congenital heart defects or cardiac dysfunction diseases. The importance of the history and physical examination cannot be overemphasized in the evaluation of infants and children with suspected cardiovascular disorders (1). Unlike adults, ACS is not in the top list of differentials for pediatric chest pain complaints. Understanding the nature of the complaint, pediatric physiology, paired with a PAT assessment will aid BCEHS practitioners in further treatment and conveyance options to best suit these pediatric patients.

Essentials

- A slow (bradycardic)heart rate is often a result of hypoxia.
- Effective airway management is paramount in pediatrics with low heart rates. Ensuring adequate oxygen and ventilation while correcting the source of hypoxia is crucial.
- Concerning Cardiac Signs/Symptoms:
  - For infants:
    - Decreased growth
    - Decreased feeding
    - Cyanosis
    - Respiratory Distress

    For older children:

    - Poor exercise tolerance
    - Fatigue
    - Dyspnea
    - Orthopnea

Additional Treatment Information

- **Differential Diagnosis of Chest Pain in Pediatric Patients**

  Arrhythmias: Supraventricular Tachycardia (SVT), Ventricular Tachycardia (V-Tach), Bradycardia

  Structural abnormalities: Cardiomyopathies, Pulmonary Stenosis, Murmurs, Mitral Valve Prolapse, Aortic stenosis, Marfan syndrome (dissecting aortic aneurysm)

  Infection/Inflammation: Pericarditis, Myocarditis, Pancreatitis, Cholecystitis, Pneumonia, Esophagitis, Herpes simplex

  Coronary Artery: Ischemia/infarction. Vasospasm

  Trauma: Overuse injury (Sprain/Strains), Pneumothorax,

  Substance: sympathomimetic ingestion

  Psychosocial: Anxiety, Hyperventilation

  (Kliegman, 2020)

General Information

- Sinus arrhythmia is a normal variant seen in children and is described as a variation in heart rate over time without symptoms. The variation coincides with breathing. Typically, the rate increases during inhalation and decreases during exhalation. There is no concern if this is the lone finding.

- Tachycardia is a sustained increased heart rate. A heart rate > 180 bpm in a child, or > 220 bpm in an infant, is unlikely to be rapid sinus tachycardia and more likely to be an arrhythmia.
  - Narrow complex tachycardia (QRS < 0.09 seconds) with visible p-waves is considered to be sinus tachycardia and a primary cause should be determined. No specific cardiac management of sinus tachycardia is needed. Treat the underlying cause (e.g., pain, fever, hypovolemia, hypoxia, or anemia) as appropriate.
  - Narrow complex tachycardia with no visible p-waves, with abrupt onset or termination and no change with activity, is considered to be SVT. Stable patients with no previous history and no hemodynamic compromise require support with oxygen, continuous cardiac monitoring, and conveyance to ED, with equipment for electrical cardioversion immediately available. Symptomatic patients should be treated with a vagal maneuver, adenosine, or cardioversion if unstable.
  - Wide complex tachycardia (QRS > 0.08 seconds) in a conscious patient with adequate perfusion and a heart rate > 150 bpm is probably in stable ventricular tachycardia and requires support with oxygen, continuous cardiac monitoring, and conveyance to ED, with equipment for electrical cardioversion immediately available.
  - Wide complex unstable tachycardia in a child with poor perfusion should be considered ventricular tachycardia and be treated rapidly with synchronized cardioversion with sedation if readily available.
  - In refractory cases or situations where appropriate treatment options are unclear, contact Clinicall.
- Bradycardia is a sustained decreased heart rate. In the pediatric populations, bradycardia is usually secondary to a different pathology and treatment focuses on the underlying cause.
  - As hypoxia may be a contributor, ensure optimized oxygenation and ventilation, including bag-valve mask if needed.
  - Consider a 20cc/kg crystalloid bolus to address hypotension.
  - In a pediatric patient with a HR < 60 bpm coupled with poor perfusion, CPR is indicated. Ensure maximal oxygenation and bag-valve mask ventilation is provided. If heart rate remains < 60 bpm for 30 seconds of effective oxygenation and ventilation, begin chest compressions. Signs of poor perfusion include cyanosis, mottling, decreased LOC, and lethargy.
  - Epinephrine 0.01 mg/kg IV/IO is indicated for bradycardia unresolved by oxygenation, ventilation, and chest compressions.
  - Atropine is only indicated when increased vagal tone or primary AV block is the suspected etiology of the bradycardia; with all other causes, epinephrine is preferred.
  - Bradycardia with complete heart block or a history of congenital or acquired heart disease, pacing may be indicated.
- BRUE (Brief Resolved Unexplained Event) and ALTE (Apparent Life Threatening Event) are not specific disorders but terms for a group of alarming symptoms that can occur in infants. They involve the sudden appearance of respiratory symptoms (such as apnea), change in colour or muscle tone, and/or altered responsiveness. Events typically occur in children < 1 year with peak incidence at 10 to 12 weeks. Some of these events are unexplained (and designated BRUEs), but others result from numerous possible causes including digestive, neurologic, respiratory, infectious, cardiac, metabolic, or traumatic (e.g., resulting from abuse) disorders.

Interventions

First Responder

- Keep the patient at rest
- Position the patient: if symptoms suggest hypotension, position supine
- Provide supplemental oxygen as appropriate
  - → A07: Oxygen Administration
- Manage airway as appropriate
  - → B01: Airway Management
- If HR < 60 bpm with signs of poor perfusion, provide 100% oxygen and bag-valve mask ventilation; if no improvement after 30 seconds, begin CPR
  - → PR06: High Performance CPR
  - → M06: Pediatric Cardiac Arrest
- Consider underlying causes
  - → M03: Pediatric Respiratory Emergencies
  - → M04: Pediatric Neurological Emergencies

Emergency Medical Responder – All FR interventions, plus:

- Initiate rapid conveyance with notification
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access (in patients ≥ 12 years of age)
  - → D03: Vascular Access
  - ClinCall consultation required prior to fluid administration for pediatric fluid requirements

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

→ PR16: 12-Lead ECG

Tachycardia

- Asymptomatic: no treatment required
  - Consider crystalloid bolus if no cardiac history
- Unstable narrow complex tachycardia
  - Vagal maneuver
    - → PR28: Modified Valsalva
  - Adenosine
    - Do not use adenosine if the patient is taking carbamazepine or dipyridamole
  - Synchronized cardioversion; initial at 1 J/kg, repeat at 2 J/kg
    - → PR20: Synchronized Cardioversion
    - For sedation prior to cardioversion, consider:
      - MIDAZOLam
        - MIDAZOLam may depress respiratory rate and blood pressure
      - KetAMINE
        - KetAMINE should be used with caution where the shock index is > 1 – have push dose EPINEPHrine readily available in these cases
- Unstable wide complex tachycardia
  - Vagal maneuver
    - → PR28: Modified Valsalva
  - Synchronized cardioversion; initial at 0.5 – 1 J/kg, repeat at 2 J/kg
    - → PR20: Synchronized Cardioversion
  - ClinCall consultation required for refractory cases or where treatment options are unclear.

Bradycardia

- Asymptomatic: no treatment required
  - Consider crystalloid bolus if no cardiac history
- Unstable bradycardia
  - EPINEPHrine
  - Atropine – if increased vagal tone suspected
    - ClinCall consultation required prior to repeat dose Q 3-5 min to a maximum total dose of 0.4 mg/kg or 1 mg, whichever is less (1-833-829-4099)
  - Transcutaneous pacing
    - → PR19: Transcutaneous Pacing
    - ClinCall consultation required prior to transcutaneous pacing (1-833-829-4099)

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Tachyarrhythmias
  - Amiodarone
  - Lidocaine
  - Digoxin has many drug incompatibilities and administration should be done in consultation with BC Children’s Cardiology

Evidence Based Practice

Pediatric Bradycardia

Supportive

Neutral

Against

Pediatric Tachycardia

Supportive

- Vagal Maneuver / ice water
- Adenosine
- Amiodarone
- Electrical Cardioversion

Neutral

- Digoxin

Against

- Verapamil

M02: Pediatrics - Circulatory Emergencies

Heather Rose

Updated: October 30, 2023
Reviewed: October 24, 2023

Introduction

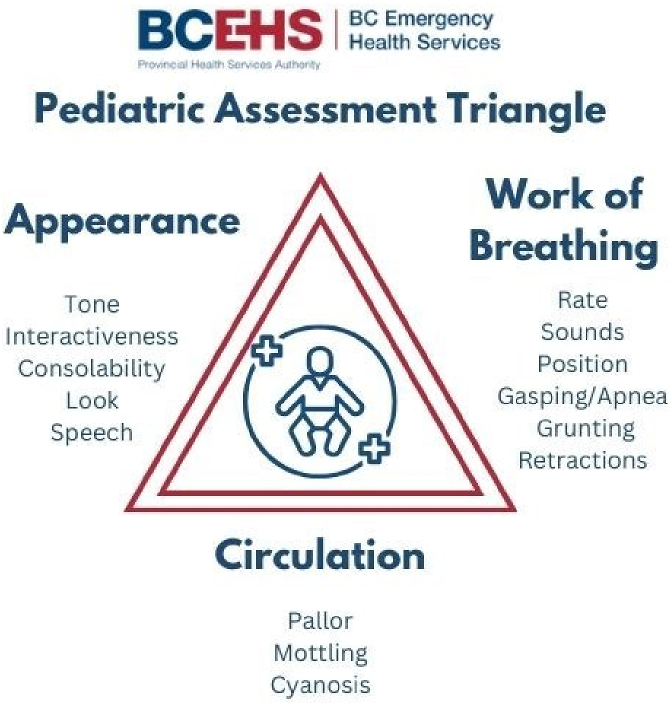
Shock is a dynamic and unstable pathophysiologic state characterized by inadequate tissue perfusion [1]. Shock develops as the result of conditions that cause decreased intravascular volume, abnormal distribution of intravascular volume, and/or impaired cardiovascular function. These conditions can then cause:

- Insufficient circulating blood volume (preload)
- Changes in vascular resistance (afterload)
- Heart failure (contractility)
- Obstruction to blood flow

The leading cause of pediatric shock globally is hypovolemia resulting from gastroenteritis [2]. The widespread adoption of oral rehydration therapy has significantly decreased mortality rates in these cases. Another significant contributor to pediatric mortality is trauma, including instances of hemorrhagic shock. Severe sepsis is also a common occurrence among children worldwide. It particularly affects low birth weight newborns, infants under one month old, immunosuppressed individuals, and children with chronic debilitating conditions. Cardiogenic and obstructive shock are relatively rare occurrences in the pediatric population.

The initial signs of shock may be subtle in children and infants as their compensatory mechanisms are very effective. A child may lose 25% of their circulating blood volume before becoming hypotensive [3]. When the compensatory mechanisms fail, the child progresses quickly to decompensated shock where the “classic” signs and symptoms of shock are present such as: tachycardia, pallor, cold extremities, and altered levels of consciousness. When this occurs, cardiopulmonary arrest may be imminent. Key considerations when assessing pediatric patients in potential shock states:

- **Compensatory Mechanisms**: Children are often better at compensating for certain medical conditions compared to adults. Their bodies may maintain stable vital signs for a longer period before decompensating, which means they can hide signs of illness or shock until they reach a critical stage.
- **Early Recognition and Intervention**: Recognizing signs of shock in pediatric patients early on is crucial because they can deteriorate rapidly once their compensatory mechanisms begin to fail. Timely intervention is essential to improve outcomes.
- **Observation at Rest**: One way to identify shock symptoms in children is by observing them while at rest. This means paying close attention to their overall appearance and behavior, as well as monitoring vital signs like heart rate and blood pressure.
- **Pediatric Assessment Triangle (PAT)**: The pediatric assessment triangle is a tool used to quickly assess the overall condition of a pediatric patient. It consists of three components:
  - **Appearance**: This refers to the child's overall appearance, including their level of alertness, interaction with the environment, and skin color.
  - **Work of Breathing**: It involves assessing the child's breathing effort, such as retractions (visible sinking of the chest or ribs during breathing), grunting, or abnormal breath sounds.
  - **Circulation**: This component looks at the child's heart rate and perfusion, including skin temperature, capillary refill time, and pulses.



- **Transport to the Emergency Department (ED)**: Any pediatric patient showing signs of shock or concerning symptoms should be promptly transported to the nearest appropriate medical facility, typically an Emergency Department. Early access to specialized care is crucial.
- **Basic Priorities**: At a basic level, there are several priorities when managing pediatric patients in shock, including:
  - **Adequate Oxygenation**: Ensuring that the child is receiving enough oxygen to meet their body's needs.
  - **Appropriate Patient Positioning**: Positioning the child in a way that maximizes their comfort and respiratory function.
  - **Fluid Administration**: Administering fluids as needed to help restore circulating blood volume and improve circulation.

Essentials

- Know and be familiar with normal vital signs for given ages. Use BC PEWS vital signs reference card for most accurate parameters.
- Classic systems-based shock categories are septic, hypovolemic, anaphylactic, cardiogenic, obstructive, and neurogenic.
  - **Compensated shock:** An adequate age-appropriate blood pressure is maintained
  - **Decompensated shock:** Classic signs of shock present: Tachycardia, altered level of consciousness, pale skin, cool extremities
- → Shock states
- → Pediatric sepsis criteria

Additional Treatment Information

- Treatments must be targeted to the underlying cause. Vascular access is critical, but not all problems are responsive to fluid.

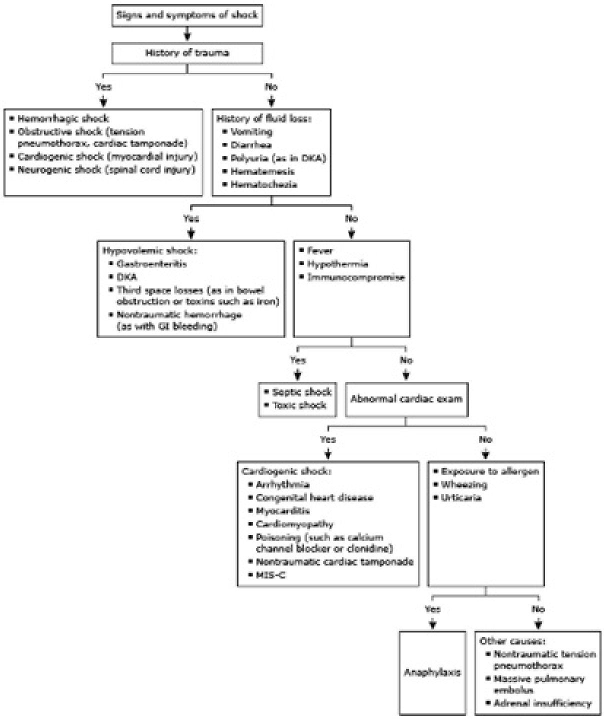
Signs of shock or other serious illness may mimic those in adults, but may also include:

- Tachycardia/bradycardia
- Pale/cool/mottled skin
- Capillary refill > 2 seconds
- Narrowing pulse pressure
- Tachypnea
- Relative flaccidity
- Change in level of consciousness (LOC) – especially failure to recognize/respond to carer(s)

In addition to oxygen, vascular access, and patient positioning, type-specific priorities are:

- Septic shock: 10-20 mL/kg crystalloid bolus, early antibiotics, vasopressors, steroids, and blood products
- Anaphylactic shock: EPINEPHrine 0.01 mg/kg, 10 mL/kg crystalloid bolus (repeated as necessary), vasopressors, and steroids
- Hypovolemic: 20 mL/kg crystalloid bolus, packed red blood cells, platelets, and plasma
- Cardiogenic: 5-10 mL/kg crystalloid bolus (Clinicall/TA consult), arterial line monitoring, vasopressors, inotropes, and chronotropes
- Obstructive: Identify and treat cause
- Neurogenic: 10 mL/kg fluid bolus (may repeat as necessary), vasopressors, and inotropes

General Information



Interventions

First Responder

- Place the patient in a position of comfort, as permitted by clinical condition; in general, this will include laying the patient supine and keeping them warm.
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medication and identification documents
- Communicate patient deterioration to follow-on responders
- Manage airway and breathing as required
  - → B01: Airway Management
  - Most pediatric airways can be effectively managed with proper positioning and an OPA/NPA (as per license level) and BVM without any requirements for further airway interventions. The gold standard for airway management is a self-maintained airway. Two-person bag-valve mask, with a viral filter attached and a tight seal, is the preferred technique for airway management in pediatric resuscitation and is reasonable compared with advanced airway interventions (endotracheal intubation or supraglottic airway) in the management of pediatrics during a cardiac arrest in the out-of-hospital setting.

Emergency Medical Responder – All FR interventions, plus:

- Expedite conveyance
- Assess for treatable cause of shock
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access while en route; depending on suspected pathology, consider volume replacement (in patients ≥ 12 years of age)
  - → D03: Vascular Access and Fluid Administration
- Consider reversible causes:
  - → E01: Hypoglycemia and Hyperglycemia
  - → J12: Opioids

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Attach monitor and evaluate rhythm for cardiac disturbances or arrhythmias secondary to shock physiology
- Consider vascular access
  - → D03: Vascular Access and Fluid Administration
  - → PR12: Intraosseous Cannulation
- Consider treatable causes
- Consider vasopressors
  - EPINEPHrine

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Aggressive fluid replacement including blood products for suspected hemorrhagic shock
- Maintain normothermia. Actively rewarm if necessary
- Ultrasonography to assess pneumothorax, tamponade, and cardiac contractility
- Post-return of spontaneous circulation care:
- Advanced airway
- Crystalloid bolus 20 ml/kg IV/IO
- **EPINEPHrine** infusion

Evidence Based Practice

Hypovolemic Shock

Supportive

- Fluid Resuscitation
- Mechanical Intraosseous Insertion
- Shock Prediction Tool
- Blood transfusion

Neutral

- Manual Intraosseous Insertion
- Aggressive Crystalloids
- Restricted Crystalloids

Against

Pediatric Anaphylaxis

Supportive

- Epinephrine

Neutral

Against

Septic Shock

Supportive

- Aggressive Crystalloids

- Colloid Infusion
- Pressors
- Early Goal Directed Therapy
- Identification tools
- Manual Intraosseous Insertion
- Mechanical Intraosseous Insertion

Neutral

- Restricted Crystalloids

Against

M03: Pediatrics - Respiratory Emergencies

Heather Rose

Updated: February 11, 2024
Reviewed: October 24, 2023

Introduction

The respiratory system is responsible for the exchange of oxygen and carbon dioxide in the body. It consists of organs and structures that work together to facilitate breathing and ensure the body receives the oxygen it needs while eliminating waste carbon dioxide.

Respiratory conditions in children can be categorized into upper airway obstructions, lower airway obstructions, lower airway restrictive pathology, and disordered control of breathing.

Upper airway obstructions occur when there is an increased work of breathing due to an obstruction above the thorax. This is demonstrated in croup and epiglottitis. Lower airway obstructions, by contrast, result from obstructive problems below the thorax such as increased swelling, or bronchospasm. Obstructions can originate from multiple causes, a few common ones being foreign bodies, infections, or anaphylaxis.

Restrictions in the lower airways can be a result of "stiffening" of lung tissue, caused by increased fluid accumulation, toxic exposure, allergic reactions, infiltration, or inflammation. These situations can be best managed with a staged approach of oxygenation and/or ventilation strategies.

Dysfunction within the respiratory center of the brain is responsible for the development of disordered breathing. These situations typically stem from neurological disfunction and secondarily affect respiratory patterns. This can include problems such as increased intracranial pressure, neuromuscular disease, and some poisonings and overdoses.

Respiratory failure occurs when a patient's breathing becomes inadequate and results in ineffective oxygenation and/or ventilation.

Essentials

- The PAT is designed to be a quick and efficient assessment tool. In emergency situations, where time is crucial, healthcare providers can rapidly observe a child's appearance, breathing, and circulation to gather essential primary assessment information about the patient's condition in a short amount of time.
- The PAT relies on visual observation and doesn't require any specialized equipment or extensive medical knowledge
- The component of appearance can be assessed utilizing the mnemonic TICLS, which stands for **Tone, Interactiveness, Consolability, Look and Speech.**
- Upper airway obstruction can be an uncomfortable call to attend as many patients may look ill or unwell, but require purely comfort levels for treatment.
  - See → B04: Croup and Epiglottitis for additional information on the management of upper airway obstructions
- Lower airway obstruction results in an inability for the patient to get air out of the chest. This is usually due to excessive swelling or bronchospasm.
- Lower airway restrictive pathologies consist of numerous conditions that result in decreasing lung compliance or stiffening of the lung. The general management of these conditions concern correcting oxygenation and ventilation utilizing an escalation pathway of increasing FiO_2 via nasal cannula, face mask, heated HiFlow nasal cannula (2 L/min to a max of 60 L/min), NIV therapy, then intubation. Bronchospasm can be treated with a B_2 agonist.
- Disordered Control of Breathing are a series of conditions affecting the respiratory control center in the brain or neuromuscular diseases.

Additional Treatment Information

Refer to the additional clinical practice guidelines for symptom-specific treatment planning:

- → B01: Airway Management
- → B02: Airway Obstruction
- → B03: Asthma and Bronchospasm
- → B04: Croup and Epiglottitis

General Information

- Continuous salbutamol can decrease serum potassium.
- Ventilating the lower airway restrictive disease patient may require high peak inspired pressure of up to 32 cmH_2O and high PEEP of up to 10-15 cmH_2O. Diligent monitoring for the development of a pneumothorax is required.
- Succinylcholine should be avoided in the patient with neuromuscular disease due to the possibility of triggering hyperkalemia or malignant hyperthermia.

Interventions

First Responder

- Provide reassurance and a calming environment
- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition. In general, limit patient movement.
- Provide supplemental oxygen as required to maintain oxygen saturation ≥97%
  - → A07: Oxygen Administration
- Conduct ongoing assessment and gather collateral information, such as medications and identification documents
- Establish ingress and egress routes from the patient's location
- Communicate patient deterioration to follow-on responders
- Manual airway maneuvers as required
  - → B01: Airway Management
  - Most pediatric airways can be effectively managed with proper positioning and an OPA/NPA (as per license level) and BVM without any requirements for further airway interventions. The gold standard for airway management is a self-maintained airway. Bag-valve mask is the preferred technique for airway management in pediatric respiratory emergencies and is reasonable compared with advanced airway interventions (endotracheal intubation or supraglottic airway).

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain SpO_2 ≥ 97%
  - → A07: Oxygen Administration
- If functional airway obstruction present
  - → B02: Airway Obstruction
  - → PR07: Nasopharyngeal Airway
- Convey with notification
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Supraglottic airway devices may be used to support oxygenation and ventilation in a staged approach, following confirmation of the ability to ventilate the patient with a bag-valve mask and oropharyngeal airway:
  - → PR08: Supraglottic Airway
- For bronchospasm, reactive airway disease, and asthma:
  - Salbutamol via MDI
  - □□ **Requires completion of PCP scope expansion education:**
    - Consider nebulized Salbutamol and ipratropium
  - Consider intramuscular EPINEPHrine; epinephrine via intramuscular injection should be considered for a patient with SpO2 < 90% and moderate to severe symptoms of asthma that are unresolved with the use of salbutamol administered by MDIs
  - See → B03: Asthma and Bronchospasm for additional information
- For croup and epiglottitis
  - Croup: consider nebulized EPINEPHrine (NOT for epiglottitis)
  - See → B04: Croup and Epiglottitis for additional information
- Consider vascular access and fluid administration (in patients ≥ 12 years of age)
  - → D03: Vascular Access and Fluid Administration

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider addition of ipratropium to supplement salbutamol
- Consider magnesium sulfate for significant and protracted bronchospasm
- Consider intraosseous cannulation if peripheral access is unavailable
  - → PR12: Intraosseous Cannulation
- Consider procedural sedation to facilitate airway management. Where SGAs and/or bag-valve mask ventilation fail to provide adequate oxygenation, tracheal intubation may be permissible in cases where paramedics are otherwise unable to obtain and maintain a patent airway. To be clear, this is for actual or immediately impending failure of airway patency unable to be managed by any other means other than intubation. ClinCall consultation required prior to attempting intubation.
  - → PR17: Procedural Sedation
- Consider intubation in patients whose airways cannot be managed through less invasive means
  - → PR18: Anesthesia Induction
- Decompress suspected tension pneumothorax
  - Out-of-hospital needle thoracentesis should be considered AGMP. Although this is a low occurrence procedure, it does potentially expose the paramedic to an increased risk of exposure. If this procedure is needed, crews are directed to proceed with airborne PPE including face-shield, EHFR/N95 mask, gown, and gloves.
  - → PR21: Needle Thoracentesis

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Mechanical ventilation (NIV and invasive)
- Chest tube maintenance
- Osmotic agents
- 3% Saline
- Infusion medication
- Antibiotic therapy
- Steroid therapy
- Nonselective adenosine receptor antagonist and phosphodiesterase inhibitor

Evidence Based Practice

Pediatric Wheeze/Bronchospasm

Supportive

- Anticholinergic
- Beta Agonist-MDI
- Beta Agonist-Nebulized
- Beta Agonist-Parenteral
- Epinephrine-Nebulized
- Epinephrine-Parenteral
- Hypertonic Saline-Nebulized
- Oxymetry Monitoring
- Steroids-Parenteral
- High flow nasal canula
- Ketamine

Neutral

- Magnesium Sulfate-IV
- Magnesium Sulfate-nebulized
- Oxygen-Humidified
- PEEP

- Steroids-Inhaled
- Steroids-Oral
- NiPPV
- ETCO2
- Temperature Monitoring

Against

Pediatric Stridor

Supportive

- Epinephrine-Nebulized
- Oxygen-Humidified
- Steroids-Oral

Neutral

Against

M04: Pediatrics - Neurological Emergencies

Heather Rose

Updated: November 05, 2023
Reviewed: October 24, 2023

Introduction

An altered level of consciousness is an abnormal neurological state where a child is less alert or responsive than would be appropriate for their baseline neurological state. Establishing what the child is usually capable of with regards to any preexisting neurological impairments is of utmost importance.

Signs of an altered level of consciousness range from unresponsive or unconscious (GCS 3), to severely agitated and heightened (RASS +4). There are numerous causes behind altered LOC, some being life threatening and others less concerning. Distinguishing the variances and causes can be challenging in the prehospital setting.

When assessing and providing care for these patients, paramedics and EMRs/FRs should prioritize overarching objectives. These include ensuring an open airway, offering support for adequate oxygenation, ventilation, and circulation. It's crucial to remain vigilant for any potential reversible causes of altered consciousness throughout the evaluation and treatments. These situations may be inherently stressful for parents or caregivers of the child.

Common causes of pediatric altered level of consciousness may include but is not limited to: Syncopal episodes, Seizures due to fever (febrile), Hypoglycemia secondary to juvenile diabetes, and head injuries.

Essentials

Regardless of the underlying cause, patients with altered levels of consciousness are at high risk of functional airway obstruction and hypoxia. Management of oxygenation and ventilation must take priority over a search for potentially reversible causes.

The search for reversible causes should be conducted systematically. A number of mnemonics exist to guide paramedics and EMRs/FRs in their investigations. Regardless of which tool is used, paramedics and EMRs/FRs should consider, at a minimum **AEIOUTIPS**:

- Alcohol and intoxicants
- Epilepsy, endocrine (hypoglycemia), electrolytes
- Insulin
- Overdoses, accidental or intentional
- Underdosing of medication or uremia
- Trauma
- Infection
- Psychosis
- Sepsis, shock, stroke
- Hypotension
- Hypoxia
- Hypo or hyperthermia
- If a potentially reversible cause is found, refer to the appropriate CPG for management details.

Syncope should be considered a diagnosis of exclusion. Paramedics and EMRs/FRs must look for reversible or life-threatening causes of unconsciousness and rule these out prior to considering syncope as the cause of the altered level of consciousness.

Additional Treatment Information

- As with adults, assessments of patients with an altered level of consciousness should focus on airway protection, oxygenation, ventilation, and an evaluation of blood glucose.
- Febrile seizures are generally benign and do not require treatment if of short duration. Treating a fever does not prevent recurrence of seizures.
- Assessment and treatment priorities of stroke are primarily maintaining ABCs and attaining vascular access if it does not interfere with rapid conveyance to a tertiary facility.
- If not associated with a primary cause that requires intervention (such as trauma), headaches can be treated with support,

position of comfort, and a calm dark environment.
- Treatment in spinal emergencies is supportive and prioritization of conveyance to a tertiary facility.
- Syncope is frequently benign, but should not necessarily prompt a decision to avoid conveyance. In cases where a patient has a cardiovascular history, careful monitoring of an ECG and vital signs are important.

Referral Information

All patients exhibiting signs and symptoms of an altered LOC and neurological disorder require evaluation in hospital, even if transient.

General Information

Syncope

Syncope is a clinical syndrome in which a transient loss of consciousness is caused by a period of diminished cerebral blood flow. By definition, the duration of the event is usually brief with a spontaneous to normal baseline consciousness. Recovery from syncope is usually rapid and complete with episodes rarely lasting more than a minute or two. Syncope can also be a sign of a potentially serious and life-threatening condition. Some patients experience syncope without warning. They lack pre-syncope signs or symptoms and experience a sudden collapse followed immediately by a return to normal mental status.

- Vasovagal syncope is a common and benign cause of syncope. It occurs due to an inappropriate response by the autonomic nervous system, typically to triggers such as changes in posture, pain, the sight of blood, or extreme emotional distress. Prodromal symptoms are common and can include a feeling of lightheadedness or dizziness, weakness, nausea, blurred vision, and a general sensation of unwellness or unease. Patients may be pale and diaphoretic. Vasovagal syncope is a diagnosis of exclusion
- Patients who experience syncope (and caregivers of) are often inclined to refuse service. The diagnostic tests required to safely include or exclude potential causes of syncope or transient loss of consciousness are not available in the out-of-hospital environment. This may include ECG monitoring, lab work, or imagining. Paramedics and EMRs are expected to follow the appropriate guidelines with respect to these refusals which may include CliniCall consultation and having refusal of care signed on the ePCR.

Febrile Seizure

A febrile seizure is a type of convulsion or seizure that occurs in young children, typically between the ages of 6 months and 5 years, as a result of a sudden spike in body temperature, often associated with a fever secondary to respiratory or gastrointestinal viruses. The fever itself, rather than the underlying illness, is what triggers the seizure. This is the bodies way of trying to reset the system back into normal physiological parameters to maintain homeostasis. These seizures can be quite frightening for parents or caregivers to witness but are usually not harmful and do not indicate underlying epilepsy or a serious medical condition. Febrile seizures can vary in duration and severity but typically involve the child losing consciousness and experiencing rhythmic jerking or twitching movements, often involving both arms and legs. The child may also become unresponsive during the seizure. Most febrile seizures are brief and last for less than 5 minutes. If a seizure persists for longer than 5 minutes or if multiple seizures occur in a short period, it is considered a complex febrile seizure, which may require medical attention. After the seizure ends, the child may appear confused, drowsy, or irritable for a short time. This is called the postictal state and is a normal part of the seizure as the brain responds. Pediatric seizure management is the same as adults in the sense that proper airway management is the hallmark priority.

→ F02: Seizure CPG

Assessment of the Altered LOC Patient

The Richmond Agitation-Sedation Scale (RASS) is a numerical scale used to assess a patient's level of sedation or agitation. This is particularly useful in patients that have previously been sedated either in or prehospitally by a healthcare professional, or if they have ingested recreational illicit substances. It is also useful in excited delirium situations either from psychological or illicit substance use causes.

The Glasgow Coma Scale/Score is a numerical scale used to evaluate a patient's neurological state or level of consciousness after head injury or trauma that caused an altered level of consciousness. This is useful in trauma patients, stroke patients, or other causes of altered LOC that are not related to sedative substances.

Richmond Agitation and Sedation Score

Glasgow Coma Scale/Score

There is a pediatric Glasgow coma scale available for use in patients under 2 years old that do not yet communicate verbally or follow simple commands.

Pediatric Glasgow Coma Scale

Pediatric Altered Level of Consciousness Podcast

Interventions

First Responder

- Position of comfort for the patient. If symptoms suggest hypotension, lay the patient flat provided this does not exacerbate other symptoms.
- Provide supplemental oxygen as required to maintain saturation ≥97%.
  - → A07: Oxygen Administration
- Provide positive pressure ventilation if respirations are inadequate
  - → B01: Airway Management
- Obtain capillary blood sample and correct as appropriate as per license level
  - → E01: Hypoglycemia and Hyperglycemia
  - Oral 40% Glucose Gel
- Correct suspected narcotic intoxication
  - → J12: Opioids (do not administer naloxone to neonates)

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain SpO2 ≥97%
  - → A07: Oxygen Administration
- Convey urgently
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider use of nasopharyngeal airway if unsuitable for oropharyngeal airway
  - → PR07: Nasopharyngeal Airway
- Consider use of supraglottic airway in obtunded patients
  - → PR08: Supraglottic Airway
- Consider vascular access and fluid administration (in patients ≥ 12 years of age)
  - → D03: Vascular Access
- Consider need for analgesia:
  - → E08: Pain Management
- Consider Glucagon

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Advanced airway management as required
  - → PR18: Anesthesia Induction
- Monitor for cardiac dysrhythmia
- Control seizures where required.
  - → F02: Seizures
  - MIDAZOLam
- Analgesia
  - FentaNYL
  - KetAMINE
  - ClinCall consultation required if additional analgesia necessary.
  - Unlike with adults, pre-treatment with ondansetron significantly decreases ketamine induced vomiting; consider ondansetron whenever using ketamine in children aged 12-18
- **Sedation, Seizure, Analgesia:**

- 3 month old (Broselow Pink)
- 6 month old (Broselow Red)
- 1 year old (Broselow Purple)
- 2 year old (Broselow Yellow)
- 3 year old (Broselow White)
- 4 year old (Broselow White)
- 6 year old (Broselow Blue)
- 10 year old (Broselow Blue)
- 12 year old

Evidence Based Practice

Pediatric Altered Mental Status (NYD)

Supportive

Neutral

Against

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M05: Pediatrics - Trauma

Alex Kuzmin

Updated: June 02, 2021
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Introduction

Trauma is the leading cause of death in children and is responsible for more deaths and potential years of life lost than all other causes combined. Blunt injury accounts for 90% of these trauma cases, with 10% attributable to penetrating injury. The recognition of hidden injuries and rapid stabilization and conveyance of critically injured patients are the foundations of trauma care in all patients, including children.

Essentials

- In general, trauma patients cannot be stabilized in the out-of-hospital environment. They will continue to deteriorate until they receive definitive surgical care.
- Paramedics and EMRs/FRs should maintain a high index of suspicion when confronted with what appear to be minor injuries associated with a significant mechanism.
- Children are at higher risk for cervical spine injury because of their larger, heavier heads, and weakly developed spine and neck muscles.
- Early deaths in hospital are most commonly due to uncontrolled shock or head injury.
- Due to their relatively healthy cardiovascular systems, children are known to be able to compensate well for blood loss. Heart rate is a more useful guide to resuscitation than blood pressure.

Additional Treatment Information

- The only interventions that should be carried out prior to conveyance are:
  - Identification and control of hemorrhage
  - Basic C-spine stabilization when required; C-spine stabilization should not delay ABC management and rapid conveyance of patients with head injury or shock
  - Airway management and ventilatory support
  - Relief of tension pneumothorax
  - Simple stabilization of long bone and pelvic fractures; use a pelvic binder for suspected open book fractures
- Except for very long conveyances, the value of an IV and fluids, even for a patient in moderate shock, is controversial and certainly does not warrant any delay.
- Radical deformities should be pulled gently to normal anatomical positioning for packaging.
- Flush grossly contaminated wounds with saline prior to applying a sterile dressing.
- If adequate airway protection and ventilatory support can be achieved through the use of a bag-valve mask and pharyngeal airway, consideration should be given to avoiding intubation in order to minimize delay at the scene.

General Information

- Pediatric airway specific considerations:
  - Due to disproportion between size of cranium and midface, consider passive C-spine flexion with padding under the shoulders
  - Relatively large, soft tissues within the laryngopharynx
  - Funnel-shaped larynx, more cephalad, and anterior epiglottis
  - Short trachea
- Failure to ensure appropriate ventilation is the most common preventable cause of death in injured children; under-recognized and under-treated hypovolemic shock is the second.
- Opiates and/or Ketamine are the preferred choices of analgesia for the pediatric population. Nitrous oxide is less effective but can also be used due to license level, unless contraindications exist.
- Unlike adults, children rarely die from isolated pelvic fractures. If hemodynamic instability exists in what appears to be an isolated pelvic fracture, look for other causes of blood loss.
- Most major pediatric intra-abdominal trauma is now managed non-operatively. Bleeding is usually self-limiting even with significant

lacerations of the liver, spleen, or a kidney.

- Major trauma criteria define patients who clearly have a high risk of death. They include but are not limited to:
  - Pediatric Trauma Score ≤ 8
  - Altered level of consciousness, GCS ≤ 13, or focal neurologic deficit
  - Respiratory distress – change in RR from normal
  - Change in HR from normal
  - Signs of hypo-perfusion – decrease in SBP by 5 mmHg from normal [80 + (2x age)]
  - Penetrating injury
  - Long bone fractures – 2 or more
  - Flail chest or open chest wound
  - Major amputation of extremity – proximal to wrist/ankle
  - Airway compromised with significant burns

Interventions

First Responder

- Assess wakefulness and perfusion
- Provide basic airway management and supplemental oxygen as required
  - → B01: Airway Management
  - → A07: Oxygen Administration
- Control life threatening bleeding
  - → D02: Bleeding
- Cover open chest wounds with a three-sided occlusive dressing
- Apply spinal motion restriction as required

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain SpO_2 ≥ 94%
  - → A07: Oxygen Administration
- Wound packing
  - → PR04: Wound Packing
- Apply chest seal to open chest wounds
- Pelvic binding if patient is > 20 kg (44 lbs)
  - → PR02: Pelvic Binders
- Consider need for inhalational analgesia: Nitrous Oxide
- Facilitate conveyance with early hospital notification
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access (in patients ≥ 12 years of age)
  - → D03: Vascular Access
- Consider need for analgesia
  - → E08: Pain Management
- Correct blood glucose
  - → E01: Hypoglycemia and Hyperglycemia
  - Assessment and correction of blood glucose level is mandatory for all patients with a head injury that presents with an altered level of consciousness (GCS < 15)

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider vascular access
  - → D03: Vascular Access
  - → PR12: Intraosseous Cannulation

- Target BP = values by age below:
  - < 28 days; > 60 mmHg
  - 1-12 months; > 70 mmHg
  - 1-10 years; > 70 mmHg + (2x age in years)
  - 10 years to adulthood; > 90 mmHg
- Tranexamic acid
- Advanced airway management as required
  - → PR18: Anesthesia Induction
- Assess for tension pneumothorax
  - → PR21: Needle Thoracentesis

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Advanced airway interventions
- Advanced diagnostics: US, CT, Angio, Xray
- Central IV access
- Blood products
  - Call ETP prior to blood product
- CBC, type & crossmatch, PT/PTT, electrolytes etc.

Evidence Based Practice

Pediatric General Trauma Care

Supportive

- Fentanyl
- Ketamine
- Morphine
- C-Spine Clearance
- HEMS
- Mechanical Intraosseous Insertion
- Nitrous Oxide
- Optimal Trip Destination
- Shock Prediction Tool
- Blood transfusion
- Intubation with in-line stabilization

Neutral

- BVM
- Cervical Collar
- Intubation
- Manual Intraosseous Insertion
- Sedation
- Spinal Precautions

Against

- Long Spinal Immobilization Devices

M06: Pediatrics - Cardiac Arrest

Heather Rose and Ryan Casselman

Updated: December 08, 2023
Reviewed: December 08, 2023

Introduction

In 2021 and 2022, 80 out of a total of 10,596 BCEHS calls pertaining to children aged 0 to 12 years were coded as cases involving respiratory or cardiac arrest. This represents 0.8% of overall pediatric calls. While infrequent, these occurrences, categorized as "High Acuity, Low Occurrence" (HALO) calls, can be inherently stressful. It has been documented that Survival is less than 10% for pediatric patients following out-of-hospital cardiac arrest (Tijssen,2015).

When managing pediatric cardiac arrests, priority is placed on delivering high-quality cardiopulmonary resuscitation (CPR) in conjunction with effective airway management. It may be challenging to immediately discern if a child's pulse is below 60 BPM. One partner may begin establishing airway management techniques if intrinsic respirations are deemed ineffective, while the other partner can focus on physically obtaining an accurate pulse reading. This may seem to prioritize airway management over initiation of compressions but in reality, these interventions should be happening simultaneously.

Upon establishing optimal oxygenation and proficient CPR, the attachment of a defibrillator assumes significance to discern the presence of a shockable rhythm. Pediatric cardiac arrests are not frequently cardiac in nature, so the application of a defibrillator should be considered only after establishment of effective airway management and high-quality CPR. Special considerations for cases involving blunt chest trauma, electrocution, cardiac history, or congenital heart anomalies may warrant expedited defibrillator application, given the heightened probability of ventricular tachycardia or ventricular fibrillation.

Pediatric cardiac arrests display distinct characteristics in comparison to neonatal and adult arrest cases. Unlike adult cardiac arrests which are typically abrupt, pediatric cases are usually not of primary cardiac origin and tend to evolve gradually as progression from respiratory failure or shock states. Consequently, indicators of deterioration such as respiratory failure, bradycardia, and hypotension, often precede cardiac arrest due to the prevailing hypoxic component. The extended decline offers a timeframe for accurate and timely pediatric assessment that is not usually demonstrated in adult or neonatal cases. With appropriate assessment and treatment, complete progression to a cardiac arrest state can be avoided

Distinct consideration is merited for hypothermic patients without a palpable pulse. The progressive impact of hypothermia is characterized by substantial reduction in respiratory and heart rates. Consequently, the assessment duration for breathing and pulse should be extended to 60 seconds, accounting for the considerably diminished rates.

- Transportation of children in cardiac arrest should not minimize or lessen quality of CPR and ventilation. Consult with CliniCall if unsure of transport decisions in prolonged arrest states with no response to treatments. High quality CPR, appropriate ventilation, timely vascular access, and a moderate scene time (10 to 35 minutes) are proven elements that improve survival from cardiac arrest with good outcomes (Tijssen, 2015).

In summary, the infrequency of pediatric cardiac arrests portrays the significance of tailored management strategies emphasizing early, accurate assessment, high-quality CPR, and suitable interventions. These interventions stand to be pivotal in offsetting the complex physiological nuances that differentiate pediatric cases.

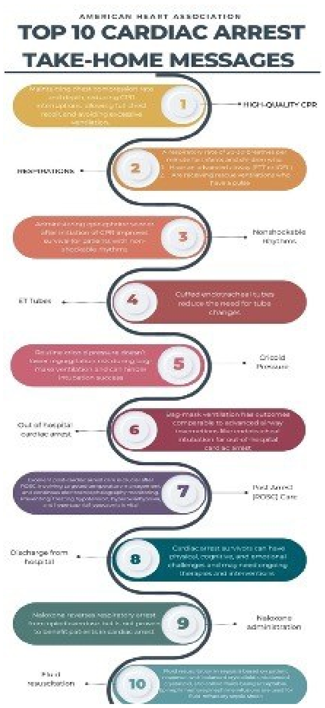
Essentials

American Heart Association Top 10 Cardiac Arrest Take Home Messages

1. High-quality cardiopulmonary resuscitation (CPR) is the foundation of resuscitation. New data reaffirm the key components of high-quality CPR: providing adequate chest compression rate and depth, minimizing interruptions in CPR, allowing full chest recoil between compressions, and avoiding excessive ventilation.
2. A respiratory rate of 20 to 30 breaths per minute is new for infants and children who are (a) receiving CPR with an advanced airway in place or (b) receiving rescue breathing and have a pulse.
3. For patients with non-shockable rhythms, the earlier epinephrine is administered after CPR initiation, the more likely the patient is to survive.
4. Using a cuffed endotracheal tube decreases the need for endotracheal tube changes.
5. The routine use of cricoid pressure does not reduce the risk of regurgitation during bag-mask ventilation and may impede intubation success.
6. For out-of-hospital cardiac arrest, bag-mask ventilation results in the same resuscitation outcomes as advanced airway interventions such as endotracheal intubation.
7. Resuscitation does not end with return of spontaneous circulation (ROSC). Excellent post–cardiac arrest care is critically

important to achieving the best patient outcomes. For children who do not regain consciousness after ROSC, this care includes targeted temperature management and continuous electroencephalography monitoring. The prevention and/or treatment of hypotension, hyperoxia or hypoxia, and hypercapnia or hypocapnia is important.

8. After discharge from the hospital, cardiac arrest survivors can have physical, cognitive, and emotional challenges and may need ongoing therapies and interventions.
9. Naloxone can reverse respiratory arrest due to opioid overdose, but there is no evidence that it benefits patients in cardiac arrest.
10. Fluid resuscitation in sepsis is based on patient response and requires frequent reassessment. Balanced crystalloid, unbalanced crystalloid, and colloid fluids are all acceptable for sepsis resuscitation. Epinephrine or norepinephrine infusions are used for fluid-refractory septic shock.



Additional Treatment Information

→ Post Cardiac Arrest Debriefing Checklist

→ Resuscitation Decision Making

For means of arrest guidelines/algorithms pediatric patients are infants, children, and adolescents up to 18 years of age, excluding newborns (0-29 days).

- Infant guidelines apply to infants younger than approximately 1 year of age.
- Child guidelines apply to children approximately 1 year of age until puberty. For teaching purposes, puberty is defined as breast development in females and the presence of axillary hair in males.
- For those patients with signs of puberty and beyond, adult basic life support guidelines should be followed.

Referral Information

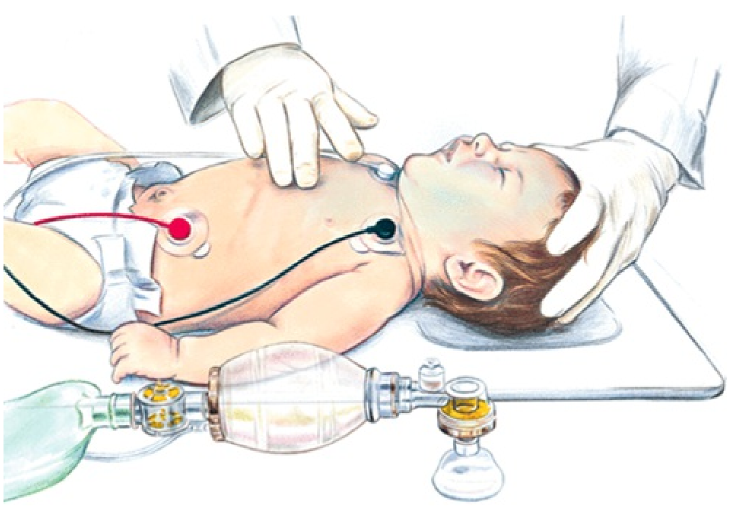
All pediatric cardiac arrest patients with ROSC require emergency conveyance to hospital. Pediatric patients with a prolonged pulseless condition should be discussed with CliniCall. Non-viable or futile cases should also be discussed with CliniCall.

General Information

- Bystander CPR, plus early defibrillation, can more than double the rate of survival from out-of-hospital cardiac arrest. As such, paramedics and EMRs should carry out a full resuscitation in settings where first responder or bystander CPR has been initiated, unless obvious signs of death are present.
- Although survival from asystole or pulseless electrical activity is rare, patients who receive immediate, high quality CPR occasionally survive.
- Asystole in cardiac arrest is usually an ominous prognostic sign indicating prolonged hypoperfusion and myocardial ischemia with deterioration to asystole from more treatable dysrhythmias. Asystole must be confirmed in two or more leads.
- Pulseless electrical activity (PEA) is evidence of organized electrical activity on the ECG without effective myocardial contraction. Patients with wide complex PEA rhythms usually have poor survival and there are often indications of severe malfunction of the myocardium or cardiac conduction system. There are numerous possible causes of PEA, some of which are amenable to out-of-hospital treatment. Paramedics (and EMRs where applicable) should follow a step-wise approach to identifying and treating reversible causes of PEA.
- Special consideration must be given to hypothermic patients without a pulse. As hypothermia progresses, the patient's respiratory and heart rate slow significantly. For this reason, breathing and pulse checks must be sufficiently long (60 seconds) to register very slow rates.
  - "Circum-rescue collapse" is a term that describes a death that occurs shortly before, during, or soon after rescue from exposure to a cold environment, usually cold water immersion; it often presents as an apparently stable, conscious patient who suffers ventricular fibrillation and cardiac arrest shortly thereafter
  - A patient with a core body temperature < 30°C will most likely develop arrhythmias with progression to ventricular fibrillation
  - Medications are more slowly metabolized in hypothermic patients; limit vasopressors to a maximum of 3 doses; refer to → I01: Hypothermia for additional information
- The most common causes of traumatic cardiac arrest include:
  - Hypoxemia from airway obstruction and hypoventilation
  - Obstructive shock resulting from cardiac tamponade or pneumothorax
  - Hemorrhagic shock from any source of major hemorrhage
  - Myocardial contusions cause dysrhythmias, perforation, and valve rupture
  - Electrical shock produces a fall; ventricular fibrillation may also be present

Interventions

First Responder

- Ensure high performance CPR and appropriate ventilation; Chest compressions and ventilations should be provided at a ratio of 15:2 with pauses to allow for ventilation
  - → PR06: High Performance CPR
  - → B01: Airway Management
  - 
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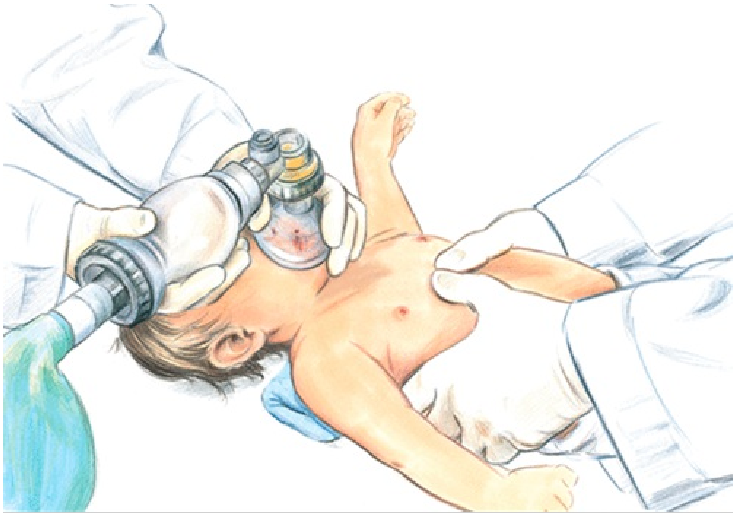


  - Most pediatric airways can be effectively managed with proper positioning and an OPA/NPA (as per license level) and BVM without any requirements for further airway interventions. The gold standard for airway management is a self-maintained airway. Two-person bag-valve mask, with a viral filter attached and a tight seal, is the preferred technique for airway management in pediatric resuscitation and is reasonable compared with advanced airway interventions (endotracheal intubation or supraglottic airway) in the management of pediatrics during a cardiac arrest in the out-of-hospital setting.
  - → A07: Oxygen Administration
- Apply AED and follow prompts
- Communicate clinical scenario to follow-on personnel
- Obtain clinical history from caregivers or bystanders

Emergency Medical Responder – All FR interventions, plus:

- Investigate for precipitating cause
- Ensure scene time is no less than 10 minutes and no greater than 35 minutes
- CliniCall consultation required for guidance in peri-arrest treatment planning.
- Seek assistance from additional resources.
- For low mechanism blunt trauma: continue CPR according to medical guidelines
- For penetrating trauma or high-mechanism blunt trauma:
  - Immediately prepare for rapid conveyance and CPR (→ N04: Traumatic Cardiac Arrest)
  - Control life threatening bleeding while facilitating conveyance
  - Direct pressure to sites of obvious ongoing blood loss
  - Rapid application of tight tourniquet for catastrophic extremity injury with ongoing large volume blood loss

Primary Care Paramedic – All FR and EMR interventions, plus:

WARNING: PRIMARY CARE PARAMEDICS EQUIPPED WITH LIFEPAK 15 MONITOR/DEFIBRILLATORS (LP15) MUST USE AN LP1000 AED WHEN MANAGING A PEDIATRIC CARDIAC ARREST IN CHILDREN UNDER THE AGE OF 8. **USE OF THE LP15 IN CHILDREN UNDER THE AGE OF 8** CAN RESULT IN ELECTRICAL ARCING, SEVERE PATIENT BURNS, AND A SIGNIFICANT FIRE HAZARD.

- Consider vascular access for reversible causes
  - → D03: Vascular Access (in patients ≥ 12 years of age)

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

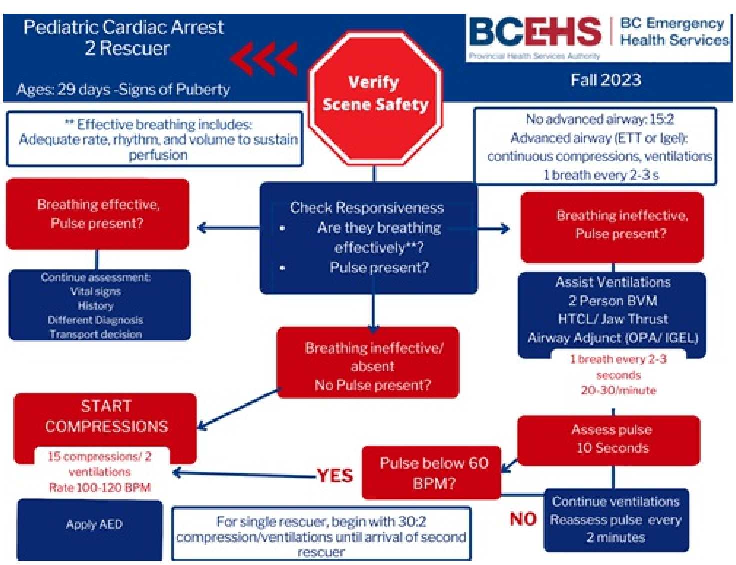
- Attach monitor and evaluate rhythm
- Establish vascular access
  - → D03: Vascular Access
  - → PR12: Intraosseous Cannulation
- Ventricular fibrillation or ventricular tachycardia
  - Defibrillate 2 J/kg, repeat at 4 J/kg
  - EPINEPHrine

  - Amiodarone
  - Lidocaine
- Pulseless electrical activity or asystole:
  - EPINEPHrine
  - Consider treatable causes
- Bradycardia:
  - Bradycardia with poor cardiac output requires chest compressions if the heart rate is < 60 and signs of poor perfusion are present; signs of poor perfusion include cyanosis, mottling, decreased level of consciousness, and lethargy
  - Consider normal saline bolus 20 mL/kg IV/IO
  - Consider EPINEPHrine
  - Consider pacing
    - → PR19: Transcutaneous Pacing
    - ClinCall consultation required prior to transcutaneous pacing.
- Hyperkalemia, Torsades de Pointes, or suspected acidosis:
  - Sodium bicarbonate
  - Magnesium sulfate
- Hypoglycemia
  - → E01: Hypoglycemia and Hyperglycemia
- Narcotic overdose:
  - → J12: Opioids
- Assess for pneumothorax
  - → PR21: Needle Thoracentesis

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Aggressive fluid replacement including blood products for suspected hemorrhagic shock
- Aggressive re-warming if hypothermia present and suspected to be primary cause of presentation
- Ultranosonography to assess pneumothorax, tamponade, and cardiac contractility
- Post-return of spontaneous circulation care:
  - Advanced airway
  - Crystalloid bolus 20 ml/kg IV/IO
  - EPINEPHrine infusion

Algorithm



Evidence Based Practice

VF/VT-Pulseless (Shock Advised)

Supportive

- Biphasic Defibrillation

Neutral

- Antiarrhythmic - Class I (Na+ channel blockers)
- Antiarrhythmic - Class III (K+ channel blockers)

Against

Post-Cardiac Arrest Care

Supportive

Neutral

- Hypothermia
- Oxygen-titrated

Against

PEA / Asystole

Supportive

Neutral

- Anticholinergic

Against

General Cardiac Arrest Care

Supportive

- Bystander CPR
- Mechanical Intraosseous Insertion
- Pre-Arrival Instructions
- Standard CPR
- Termination Resuscitation
- CPR-Finger technique
- CPR-Thumb technique
- HEMS

Neutral

- Epinephrine
- One-handed CPR
- ACLS

- Compression-only CPR
- Manual Intraosseous Insertion
- NaHCO3
- Vasopressin

Against

- High Dose Epi.

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. American Heart Association. Highlights of the 2020 American Heart Association Guidelines for CPR and ECC. 2020. [Link]
3. Heart & Stroke. 2019 Focused Updates to AHA Guidelines for CPR and ECC: Frequently Asked Questions. 2019. [Link]
4. Tijssen JA, et al. Time on the scene and interventions are associated with improved survival in pediatric out-of-hospital cardiac arrest. 2015. [Link]

Practice Updates

- 2023-10-06: updated guideline to align with Pediatric Out-of-Hospital Cardiac Arrest educational program.
- 2023-05-24: changed AED with attenuated pads use threshold to < 8 years; above 8 years, LP15 use is permitted.

M07: Neonatal Seizures

Wes Bihlmayr

Updated: May 26, 2021
Reviewed: March 01, 2021

Introduction

- Identification of seizures in neonates and children can be difficult. Signs of seizures can include rhythmic lip smacking, blinking, or "bicycling" movement of the legs. Paramedics and EMRs/FRs should manage ongoing seizures while considering reversible causes.
- The primary concern in neonatal seizures is hypoglycemia, which should be identified and corrected with a 2 mL/kg D10W bolus until the blood glucose is > 2.6 mmol/L. If IV access is not within scope of practice or cannot be obtained, glucose gel can be given orally by rubbing on oral mucosa, or glucagon can be given intramuscularly (0.03 mg/kg).
- The preferred first line medication for control of a seizure lasting longer than five minutes, or multiple seizures without improving level of consciousness in between seizures, is a benzodiazepine. Midazolam can be administered via the intranasal (IN), intravenous (IV), or intramuscular (IM) route at dosages of:
  - IN 0.2 mg/kg
  - IV 0.15 mg/kg
  - IM 0.2 mg/kg

Additional Treatment Information

- If intractable seizure despite primary and secondary pharmacological treatment, critical care paramedics may consult with the transport advisor to consider:
  - A loading dose of midazolam 50 mcg/kg followed by an infusion beginning at 120 mcg/kg/hr and titrating to effect
  - A trial of Pyridoxine 50-100 mg over 1-2 minutes

General Information

- Patients requiring multiple sedatives or anti-convulsants have a high probability of requiring an advanced airway intervention and/or hemodynamic instability.

Interventions

First Responder

- Protect the patient from additional harm
- Prevent heat loss
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Manual airway maneuvers
  - → B01: Airway Management
  - Most pediatric airways can be effectively managed with proper positioning and an OPA/NPA (as per license level) and BVM without any requirements for further airway interventions. The gold standard for airway management is a self-maintained airway. Bag-valve mask is the preferred technique for airway management in pediatric resuscitation and is reasonable compared with advanced airway interventions (endotracheal intubation or supraglottic airway).

Emergency Medical Responder – All FR interventions, plus:

- Provide on-going care as per neonatal resuscitation guidelines
  - → M09: Neonatal Resuscitation
- Obtain blood glucose measurement; consider oral glucose
  - Oral 40% Glucose Gel
- Convey urgently to closest facility; consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider use of supraglottic airway if unable to oxygenate or ventilate with bag-valve mask

  - → PR08: Supraglottic Airway
- Correct hypoglycemia
  - → E01: Hypoglycemia and Hyperglycemia
  - Glucagon

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider need for vascular access based on clinical scenario
  - → D03: Vascular Access
- Consider intraosseous access if patient meets weight based guidelines
  - → PR12: Intraosseous Cannulation
- Advanced airway intervention if unable to oxygenate or ventilate
- MIDAZOLam for seizure control

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- NIV/Invasive ventilation strategies
- Inotropic and vasopressors for hemodynamic instability
- Anti-convulsant agents for long acting effects
- Benzodiazepine infusion
- Vitamins for metabolic derangement
- Electrolyte replacement
- Antibiotic administration
- Central line and arterial line monitoring

Evidence Based Practice

<

Pediatric Seizure

Supportive

- Diazepam-IV
- Diazepam-PR
- Lorazepam-IN
- Lorazepam-IV
- Lorazepam-PR
- Midazolam-Buccal
- Midazolam-IM
- Midazolam-IN
- Diazepam-IM
- Lorazepam-IM

Neutral

Against

- Midazolam-IV
- Point of Care Blood Glucose Monitoring

M08: Neonatal Thermoregulation

Wes Bihlmayr

Updated: May 25, 2021
Reviewed: March 01, 2021

Introduction

Neonates have a high body surface to weight ratio making them more prone to the four mechanisms of heat loss: convection; conduction; radiation; and evaporation. Paramedic and EMR/FR management of neonatal thermoregulation involves these four mechanisms.

- Convection: Decrease the wind or drafts in a room.
- Conduction: Heat is lost from a warm surface to a cooler surface.
- Radiation: Heat is lost to the environment when the environment is cooler than the body.
- Evaporation: Moisture on the body can accelerate the loss of heat from the other modes of heat loss.

Essentials

- In addition to preparing an area for resuscitation during the delivery of a neonate, it is important to think about preparing the environment for the neonate. Environmental preparation revolves around the four mechanisms of heat loss:
    - Convection: Warm the room, eliminate any cold drafts
    - Conduction: Warm towels and warm surface
    - Radiation: Warm the room
    - Evaporation: Dry the baby off and place a toque on the baby's head
- The ideal temperature range for a neonate is 36.3 - 37.2°C.
- Encouraging "kangaroo care" following delivery develops a strong bond between the neonate and mother, which promotes family centred care. Kangaroo care is performed by placing the neonate on the mother's chest, creating skin-to-skin contact, while maintaining the principles of heat loss. In the stable neonate, this can be performed while APGARs are attained and awaiting delivery of the placenta.

Additional Treatment Information

- Unless there are indicators of hypoglycemia, a blood sugar is not required until a few hours after birth.

Referral Information

Neonates with no system specific problem that are maintaining a normal temperature can be left in the care of a midwife or other health care professional. If no medical professional is on scene, the mother and neonate should be conveyed for an initial assessment.

Interventions

First Responder

- Promote skin-to-skin contact while maintaining the principles of heat loss

M09: Neonatal Resuscitation

Wes Bihlmayr

Updated: January 31, 2024
Reviewed: December 14, 2023

Introduction

Neonatal resuscitation focuses on the respiratory system and transitioning from fetal circulation to neonatal circulation. These two factors are interrelated; a functioning respiratory system is necessary to deliver oxygen to produce pulmonary vasodilation, thus lowering the pulmonary vascular resistance. When combined with increasing systemic vascular resistance, this allows the closure of fetal shunts and lung perfusion to progress.

Paramedic and EMR/FR management in the resuscitation of a neonate focuses on stabilizing the respiratory system in a systemic manner from least invasive to most invasive.

Essentials

- The Neonatal Resuscitation Program (NRP) has a clearly defined algorithm for all neonatal resuscitation events. Each step in the algorithm requires 30 seconds of effective intervention prior to moving on to the next step.
  - During the first 30 seconds, begin by assessing the neonate's tone; are they at term, breathing or crying?
    - Tone: a neonate should be active with flexed extremities. If the neonate is flaccid with extended extremities, resuscitation will be required.
    - Term: if the neonate is < 37 weeks gestation, they require an initial assessment as they are more likely to require assistance either immediately or soon after delivery.
    - Breathing or crying: a strong cry is a sign of a strong respiratory system. If the neonate is not crying, then a respiratory assessment for work of breathing is required and possible movement down the resuscitation chart.
  - In the next 30 seconds, dry and stimulate the neonate, keep the neonate warm, reassess the respiratory system, and attain a heart rate.
  - Following the first minute, a decision is required: does the neonate require respiratory support or assistance (positive pressure ventilation - PPV)?
  - If the patient requires PPV, then 30 seconds of effective ventilation on room air is initiated. Effective ventilation is described as adequate chest expansion with all breaths. If all breaths are not effective, then the acronym MR SOPA should be reviewed:
    - M – Mask: Ensure adequate seal
    - R – Reposition: reposition the head, consider shoulder roll
    - S – Suction: use a 10 fr suction catheter and suction the oropharynx
    - O – Open: open the neonate's mouth
    - P – Pressure: If possible, increase the pressure being delivered; initial pressure is 20 mmHg to 25 mmHg to 30 mmHg; this can be accomplished with a flow inflating bag or Neopuff
    - A – Alternate Airway: Consider intubation or supraglottic airway if licensed to do so
  - Continue down the PPV path until effective ventilation is maintained.
  - If the HR remains in the 60-100 range with effective ventilation, then PPV must be maintained. If the HR increases to > 100 then PPV can be discontinued.
  - If the HR drops to < 60 with effective ventilation, then chest compression must be initiated at a rate of 3 compressions to 1 ventilation. Provide PPV with 100% oxygen (FiO_2 100%).
  - If the HR remains < 60 EPINEPHrine should be administered. The dose is 20 mcg/kg.
  - If there is a clinical history of blood loss and signs of poor perfusion, a volume expander should be administered: either 10 ml/kg of normal saline or "O-negative" PRBC.

Additional Treatment Information

- Throughout a neonate resuscitation, it is important to keep the neonate warm. Once a neonate becomes hypothermic, they become more susceptible to increased pulmonary vascular resistance; this in turn adversely affects the oxygenation and ventilation of the neonate and may reverse the transitioning back to fetal circulation, which is not compatible with life.
- EPINEPHrine can be administered via the endotracheal tube at a dose 10 times the IV dose - 200 mcg/kg.

- IV access can be via a peripheral IV or emergency UV.
- IO can be considered but is weight dependent.
- Uncuffed endotracheal tubes should be utilized to prevent the possibility of developing subglottic damage producing stenosis as the neonate grows.
- All pre-term neonates of ≤ 32 weeks gestation should be placed in a food grade polyethylene bag up to the neck to prevent insensible fluid loss and maintain thermoneutrality.
- A neonate delivered through thick meconium is at risk for developing increased work of breathing. If the child is vigorous, monitoring is suggested. If the neonate is not vigorous, then suctioning of the oropharynx is required, followed by movement down the treatment path. The past practice of suctioning below the vocal cords is no longer recommended.

Referral Information

All neonates requiring resuscitation should be conveyed to hospital for further work up.

General Information

- ECG monitoring should be performed during the resuscitation.
- SpO_2 monitoring must be via the pre-ductal right appendage for accurate measurements. A pre- and post-ductal (all other appendages) SpO_2 can be monitored to detect for the presence of shunts within the cardiovascular system.
- It is common for a neonate who experienced a precipitous delivery to develop increased work of breathing requiring respiratory support.

Interventions

First Responder

- Ongoing care as dictated by NRP; follow algorithm
  - Neonatal Resuscitation Algorithm
  - → A07: Oxygen Administration
  - → B01: Airway Management
  - Most pediatric airways can be effectively managed with proper positioning and an OPA/NPA (as per license level) and BVM without any requirements for further airway interventions. The gold standard for airway management is a self-maintained airway. Bag-valve mask is the preferred technique for airway management in pediatric resuscitation and is reasonable compared with advanced airway interventions (endotracheal intubation or supraglottic airway) in the management of pediatrics during a cardiac arrest in the out-of-hospital setting.
  - Resuscitation of neonates should take place with room air.

Emergency Medical Responder – All FR interventions, plus:

- Convey to the nearest hospital
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- iGEL insertion if unable to oxygenate or ventilate
  - → PR08: Supraglottic Airway

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Advanced airway intervention if unable to oxygenate or ventilate
- Consider obtaining vascular access and providing fluid for hemodynamic compromise
  - → D03: Vascular Access
- Obtain IO access if patient meets weight-based guidelines
  - → PR12: Intraosseous Cannulation
- EPINEPHrine

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- NIV/Invasive ventilation strategies
- Inotropic and vasopressor therapy for hemodynamic instability
- Central and arterial line monitoring
- Blood product administration
- UV access (needs to be added as a schedule 2)

Evidence Based Practice

Neonatal Resuscitation

Supportive

- BVM
- Chest Compressions
- Intubation
- LMA (without AW reflexes)
- Nasal Ventilation
- Resuscitation Attempts in Stillbirth
- Suction

Neutral

- Therapeutic hypothermia

Against

- Epinephrine

M10: Neonatal Respiratory

Wes Bihlmayr

Updated: May 25, 2021
Reviewed: March 01, 2021

Introduction

This practice guideline contains changes related to COVID-19.

Respiratory distress in the neonate is defined as an impairment of the lungs to exchange gas at the alveolar level. Multiple pathophysiologic processes can produce respiratory distress in the neonatal period and careful monitoring of the trend of disease progression can assist in identifying the cause.

Paramedic and EMR/FR management of the neonate in respiratory distress should focus on maintaining appropriate oxygenation and ventilation based on gestational age and days/hours of life. Differential diagnoses to consider in the newly born neonate differ than the differential diagnoses for a neonate on day of life 2 or more.

In neonates, the differential diagnoses can be:

- Respiratory distress syndrome (RDS): Primarily a surfactant deficiency that will progressively worsen until 72 hours of life and then slowly get better if no treatment is initiated. Normal in the preterm infant and higher risk in the neonate born to a mother with poorly controlled diabetes.
- Transient tachypnea of the newborn (TTN): Fluid retention in the lungs that will gradually resolve over 24-72 hours. Common in caesarean section and precipitous deliveries.
- Congenital pneumonia/sepsis: Similar physical presentation to RDS but with differing radiological evidence and can progress to sepsis quickly if not recognized.
- Pneumothorax: The neonate requires an opening pressure of up to 50 cmH_2O to push out the fluid filling the lung and can cause spontaneous pneumothoraxes.

The term neonate with an uncomplicated antenatal history that develops respiratory complications is unlikely to be RDS and is most likely to have an infection or undiagnosed congenital problems.

Essentials

- The Neonatal respiratory assessment consists of lung auscultation, evidence of nasal flaring, grunting of the neonate, accessory muscle use (begins in the subcostal and works up the chest as severity increases), and symmetry of the chest. A chest x-ray and blood gas analysis should be performed to gauge severity and initiate a baseline for trend monitoring.
- Establish ABCs and support ventilations if required.
- Support of the neonate's respirations follows a staged approach. The FiO_2 is titrated to maintain a pre-ductal SpO_2 of 88-95% in the preterm neonate and 92-95% in the term neonate. Escalation along the respiratory treatment pathway is based on clinical assessment, radiological evidence, and blood gas analysis.
- Pre-ductal SpO_2 is performed on the right hand and post-ductal on a lower appendage (right or left foot). A pre-ductal < 90% or a difference > 3% should prompt further investigations.
- Increased work of breathing with associated decreased air entry should be investigated for pneumothorax.

Additional Treatment Information

- Options for supporting neonatal respirations include:
    - Blow by oxygen: titrate to patient's SpO_2 if no increased work of breathing
    - High flow O_2: 2-3 lpm/kg of heated humidified gas; titrate FiO_2 to appropriate SpO_2
    - nCPAP: 5 cmH_2O - 8 cmH_2O; titrate FiO_2 to appropriate SpO_2
    - Intubation and mechanical ventilation
- Once a neonate is intubated, bLES should be considered. If the FiO_2 is > 30% and there is radiological evidence of surfactant deficiency, bLES is administered (5 ml/kg administered via a 6 fr OG tube down the ET tube).
- If patient is showing signs of tension pneumothorax – tracheal deviation, increased work of breathing, absent air entry, hemodynamic compromise – needle decompression should be performed while equipment is gathered for a chest tube insertion.
    - In a neonate a 26-gauge butterfly needle attached to a 3-way stop cock and 10 cc syringe is used to access the 2nd

intercostal space mid-clavicular line, to aspirate air; in an older neonate, a 20-gauge needle connected to a 3-way stop cock and 10 cc syringe may be required

- Due to the rapid progression of sepsis in the neonatal period, all neonates with signs of respiratory distress will have a blood culture done and be started on antibiotics: Ampicillin (50 mg/Kg) and Gentamycin
  - Gentamycin:
    - DOL 0-7: < 30 weeks gestation 5 mg/kg
    - 30-34 weeks gestation 4 mg/kg q 36 hrs
    - > 35 weeks gestation 4 mg/kg q 24 hrs
    - DOL > 7: < 30 weeks gestation 5 mg/kg
    - > 30 weeks gestation 4 mg/kg q 24 hrs
- Common initial ventilation settings are: RR 50 Ti 0.4 TV 4-5.5 ml/kg FiO_2 as required, PEEP 5 cmH_2O. Neonates require I:E ratios approaching 1:1. The normal range of Ti is 0.35-0.5 with most patients requiring 0.35-0.4. If a large tube leak is detected, then PCV ventilation should be considered (starting settings may be 20/5 and then are titrated to effect).
- Neonates require an uncuffed ET tube due to the possibility of subglottic damage from an ET cuff and prolonged intubation, resulting in subglottic stenosis as the neonate grows.
- Sedation in the neonate should only be initiated if there are signs of pain or discomfort based on the BIIP scale as there is evidence of increased morbidity and mortality when sedation is given to neonates with no signs of pain or discomfort. If sedation is to be initiated, the preferred analgesics are:
  - Morphine: 50 mcg/kg bolus with an infusion of 10-20 mcg/kg/hr
  - Fentanyl: 1-2 mcg/kg bolus with an infusion of 0.5-2 mcg/kg/hr
  - Midazolam: 50 mcg/kg as a bolus for the labile neonate.
- Maintenance fluids for the first 24 hours should be D10W, and after 24 hours, D10W with NaCl (20 mmol/L)
  - DOL 0 – 60-80 ml/kg/day
  - DOL 1 – 80-100 ml/kg/day
  - DOL 2 – 100-120 ml/kg/day
  - DOL 3 – 120-140 ml/kg/day
  - DOL 4 – 140-150 ml/kg/day
  - DOL 5 – 150 ml/kg/day

General Information

- Neonates that have been in the community are at an increased risk of an infective origin to their increased work of breathing; these need to be considered during the differential diagnosis:
  - Bronchiolitis
  - Pneumonia
  - Croup
  - Pertussis

Interventions

First Responder

- Maintain thermal stability
- Provide supplemental oxygen as required. The maximum flow of a nasal cannula should be 5 L/min. The maximum flow of a partial or non-rebreathing mask should be 15 L/min. A nasal cannula may be placed under an NRB or BVM when flow rates above 5 L/min are required.
  - → A07: Oxygen Administration
- Positive pressure ventilation via bag-valve-mask. Provide a tight seal with the BVM using a 2-person technique where possible. An inline viral filter should be used between the mask and the bag-valve device.
  - → B01: Airway Management
  - Most pediatric airways can be effectively managed with proper positioning and an OPA/NPA (as per license level) and BVM without any requirements for further airway interventions. The gold standard for airway management is a self-maintained airway. Bag-valve mask is the preferred technique for airway management in pediatric resuscitation and is reasonable compared with advanced airway interventions (endotracheal intubation or supraglottic airway).

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 90\%$. The maximum flow of a nasal cannula should be 5 L/min. The maximum flow of a partial or non-rebreathing mask should be 15 L/min. A nasal cannula may be placed under an NRB or BVM when flow rates above 5 L/min are required.
  - → A07: Oxygen Administration
- Convey to closest facility with notification
- Consider intercept with additional resources

M11: Neonatal Cardiovascular

Wes Bihlmayr

Updated: June 02, 2021
Reviewed: March 01, 2021

Introduction

Neonatal cardiovascular conditions range from vascular problems to congenital cardiac problems. Neonatal vascular conditions can be separated into the pulmonary vasculature and systemic vasculature; congenital cardiac conditions can be further separated into structural problems (congenital heart disease, or CHD) and intrinsic (arrhythmia).

Paramedics and EMRs/FRs must diligently investigate complaints to isolate and identify the underlying problem, while at the same time providing appropriate supportive care. Differentiation between vascular and cardiac problems begins with the antenatal history.

The time of onset of symptoms varies with the severity of the lesion for cardiac and vascular conditions. Acute, non-cyanosis-producing conditions are usually associated with the complete closure of the ductus arteriosus, which normally occurs around day 2 or 3 of life, followed by a brief symptomatic period. These conditions either result in added strain on the myocardium, signs of congestive heart failure, or signs of inadequate tissue perfusion. Acute cyanotic lesions will usually develop soon after birth and can progressively deteriorate as the ductus arteriosus closes. Arrhythmias can be well tolerated by neonates and take days to months before they are noticed.

Increased pulmonary vascular resistance in the neonatal period is usually a result of an inadequate transition to extra-uterine life. It may begin immediately following birth, to a few hours after birth with varying intensity. Decreased systemic vascular resistance is usually a byproduct of sepsis.

The clinical picture of the cardiac problem varies from progressive deterioration with subtle signs, to the acute conditions with obvious signs. In order to determine the precipitating cause, a multisystem approach involving the respiratory and cardiovascular systems is required.

Essentials

- The cardiovascular system assessment entails assessing the patient's perfusion, four limb blood pressure, assessing the pulse pressure, heart sounds, signs of hepatomegaly, pre- and post-ductal SpO_2 measurements, and radiological testing (U/S and x-ray).
- Pre-ductal SpO_2 is performed on the right hand and post-ductal on a lower appendage (right or left foot). A pre-ductal SpO_2 < 90%, or a difference > 3%, should prompt more investigations.

Additional Treatment Information

- Cyanotic CHD presents as the classic "blue baby," that is tachypneic with at times no sign of an increased work of breathing. These patients may have an oxygen challenge to assist in determine a cardiac origin. These conditions can continually deteriorate until either pharmacological or surgical intervention is performed.
  - An oxygen challenge consists of either monitoring the SpO_2 on the right-hand during room air and then with 100% oxygen administration; a difference of > 10% is usually pulmonary in nature
- Non-cyanotic CHD presentation can vary from the asymptomatic neonate with a pre- and post-ductal SpO_2 difference > 3%, to an initially asymptomatic neonate that has an acute deterioration at around 3 days of life that begins with poor perfusion, and leads to cardiogenic shock and respiratory compromise. The asymptomatic neonate requires further investigation by a cardiologist. The symptomatic neonate may require pharmacological treatment to bridge the gap before surgical treatment.
  - Pharmacological treatment consists of administering Alprostadil which is a vasodilator (Prostaglandin E1) at an initial dose of 0.02 mcg/kg/hr, followed by gradual tailoring of the dose to 0.005-0.1 mcg/kg/hr (usually requires cardiac echo to tailor); consultation with BCCH PICU and/or BCCH cardiology required to increase dose
    - Side effects include: apnea; hypotension; bradycardia; hyperthermia; and cutaneous flushing
  - Bradycardia in a neonate is defined as a heart rate < 100. The asymptomatic patient requires monitoring and conveyance to the hospital. The symptomatic patient is defined as having poor perfusion (e.g., hypotension, decreased mentation, signs of shock).
    - If HR < 60 bpm with adequate oxygenation and ventilation, start CPR
    - Medication: 0.01 mg/kg of epinephrine IV/IO
      - 0.02 mg/kg of atropine if increased vagal tone or primary AV block
    - Consider transthoracic pacing

- Tachycardia in a neonate can be classified as either:
  - Narrow complex – rate > 220 with a QRS < 0.09 mm
  - Wide complex – variable rate (can be normal) with a QRS > 0.09 mm
- In the well perfused neonate with a tachyarrhythmia, paramedics have more time to investigate the cause while preparing a treatment plan. In the poorly perfused neonate (e.g., hypotension, altered mental state, signs of shock), initiate an emergent treatment plan while investigating causative factors.
- Treatment of tachyarrhythmias moves from lowest risk to highest risk to the patient.

Intervention	Narrow Complex Tachyarrhythmia	Wide Complex Tachyarrhythmia
Vagal Maneuvers	Bag of ice and water applied to the upper portion of the neonate's head, not to occlude the mouth and nose, for 20 seconds	Bag of ice and water applied to the upper portion of the neonate's head, not to occlude the mouth and nose, for 20 seconds
Medication	Adenosine: 0.1 mg/kg to a max dose of 6 mg. If no success, then 0.2 mg/kg to a max dose of 12 mg Amiodarone **or** Procainamide only after consultation with transport advisor. Amiodarone 5 mg/kg over 20-60 minutes Procainamide 15 mg/kg over 30-60 minutes	Adenosine: If WCT is thought to be due to an abnormal intraventricular conduction. 0.1 mg/kg to a max dose of 6 mg. If no success, then 0.2 mg/kg to a max dose of 12 mg Amiodarone **or** Procainamide only after consultation with transport advisor. Amiodarone 5 mg/kg over 20-60 minutes Procainamide 15 mg/kg over 30-60 minutes Magnesium for Torsades de pointes. 25-50 mg/kg administered over 60 minutes. Diluted to 10 mg/ml.
Synchronized cardioversion	Consult transport advisor. 0.5-1 J/Kg, may increase to 2 J/Kg if not successful Sedate before cardioversion	Consult transport advisor. 0.5-1 J/Kg, may increase to 2 J/Kg if not successful Sedate before cardioversion

- Increased pulmonary vascular resistance (PVR) or persistent pulmonary hypertension (PPHN) can result from a difficult transitional period from fetal to neonatal circulation. Oxygen is required to decrease the pulmonary vascular resistance in the first minutes of life allowing the PVR to drop below the systemic vascular resistance (SVR) closing the anatomical shunts of fetal circulation; supplemental oxygen is the first intervention required in these cases. If there is a delay in oxygenation or episode of poor oxygenation in the first hours of life, the PVR can increase, reverting neonatal circulation back to fetal circulation.
- The treatment of PPHN revolves around returning the circulation back to the PVR being lower than the SVR
  - Provide supplemental oxygen
  - Assess patient fluid status and provide fluid resuscitation if required (10 ml/kg boluses NS to a max of 30 ml/kg)
  - iNO – inhaled nitric oxide is a potent pulmonary vasodilator as this can assist in decreasing the PVR; the initial dose is 20 ppm
  - Increasing the SVR with inotropes and vasopressors:
    - Epinephrine: 0.05 - 1 mcg/kg/min (0.05-0.1 mcg primarily effect B1 and B2 receptors, so increased inotropy/chronotropy and vasodilation; doses > 0.1 mcg also stimulate alpha receptors, resulting in vasoconstriction and increased SVR)
    - Dobutamine: 2-20 mcg/kg/min (primarily B1 effects increasing myocardial contractility)
    - Norepinephrine: 0.02-0.1 mcg/kg/min (strong alpha effects increasing SVR); normally only used as an addition to another inotrope in neonates
    - Vasopressin: 0.1 milliunits/kg/min, increase by 0.1 milliunit every hour to a max of 1.2 milliunits (systemic vasopressor and pulmonary vasodilator at low doses)
    - Dopamine: 5-20 mcg/kg/hr (5-10 mcg/kg/hr, primarily B1 effects and > 10 mcg/kg/hr alpha effects)
  - While treating the cardiovascular condition, a respiratory distress condition may also be treated as a result of the cardiovascular condition. See Respiratory CPG for respiratory escalation of care.

- Treatable causes of bradycardia:
  - Hypoxia
  - H+ acidosis – Correct ventilation; in extreme metabolic acidosis, consider sodium bicarbonate (1 mmol/kg)
  - Hyperkalemia
  - Heart Block
  - Toxins – See cardiac arrest CPG
  - Trauma – Cushing's triad of increased ICP; 3% saline at 2.0-5 ml/kg over 10 minutes, or Mannitol at 0.25-1.0 gram/kg over 5 minutes
- Treatable causes of tachycardia
  - If potentially a sinus tachycardia (HR < 220, discernable P-waves, rate varies with stimulation, history):
    - Fluid bolus for the dehydrated patient (10 ml/kg NS)
    - Antipyretic for the febrile patient
      - Acetaminophen: 15 mg/kg PO or PR
      - Ibuprofen: 10 mg/kg PO
    - Analgesia for pain
      - Acetaminophen: 15 mg/kg PO or PR
      - Morphine: 0.05-0.1 mg/kg IV
      - Fentanyl: 1-2 mcg/kg IV/IN/IM
      - Ketamine: 0.5 mg/kg IV/IN
    - Electrolyte disturbances (due to the variability of disturbance, consult transport advisor for development of electrolyte correction timeframe)
      - Hyperkalemia
      - Hypocalcemia
      - Hypomagnesemia
    - Drug Toxicity – unlikely in the neonatal period but should be considered; examples include TCA, cocaine, and methamphetamines
  - Risk factors associated with PPHN:
    - Hypothermia
    - SSRI during pregnancy
    - Meconium Aspiration Syndrome
    - Congenital pulmonary hypoplasia, congenital diaphragmatic hernia
  - Patients with CVS emergencies are at risk of developing coagulopathies from profound metabolic/respiratory acidosis. CBC and Coags should be monitored to direct care with respect to blood product administration.
  - Refractory hypotension in the neonate may require a hydrocortisone challenge. Discuss with the transport advisor as to a hypotensive dose (1 mg/kg) or actual cortisol challenge (1-2 mg/kg).

General Information

Amiodarone may cause hypotension if administered too quickly. The risk to the patient must be considered when administering at a quicker rate.

Interventions

First Responder

- Maintain thermal stability
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
  - Manual airway maneuvers
- Positive pressure ventilation via bag-valve mask
  - → B01: Airway Management
  - Most pediatric airways can be effectively managed with proper positioning and an OPA/NPA (as per license level) and BVM without any requirements for further airway interventions. The gold standard for airway management is a self-maintained airway. Bag-valve mask is the preferred technique for airway management in pediatric resuscitation and is reasonable

compared with advanced airway interventions (endotracheal intubation or supraglottic airway).

Emergency Medical Responder – All FR interventions, plus:

- Convey to closest facility with notification
- Consider intercept with additional resources

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider vascular access and fluid administration if hemodynamically unstable
  - → D03: Vascular Access
- Consider intraosseous access
  - → PR12: Intraosseous Cannulation
- For bradydysrhythmias, consider:
  - EPINEPHrine
  - → PR19: Transcutaneous Pacing
    - ClinCall consultation required prior to transcutaneous pacing.
- For tachydysrhythmias, consider:
  - ClinCall consultation required prior to initiating the below therapies.
  - Adenosine
  - Amiodarone
  - PR20: Synchronized Cardioversion

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- NIV/Invasive ventilation strategies
- Inotropic and vasopressors for hemodynamic instability
- Vitamins for metabolic derangement
- Electrolyte replacement
- Benzodiazepine infusion
- Antibiotic administration
- Inhaled vasodilator
- Point of care testing
- Blood product administration
- Central Line and Arterial Line monitoring
- Initiation of umbilical lines

M12: Neonatal Neurological

Wes Bihlmayr

Updated: May 25, 2021
Reviewed: March 01, 2021

Introduction

Neonatal neurological emergencies encompass a large variety of conditions including cerebral vascular accidents, developmental conditions, space-occupying lesions, and infectious encephalopathies. The majority of these conditions require advanced imaging to diagnose and will need long-term therapy.

Paramedic and EMR/FR management of the neonatal neurological emergency involves determining the time of onset and management of symptoms created by the condition. These include seizures, hypotonia, apnea, or variations in respiratory pattern, as well as absent or delayed primitive reflexes.

Essentials

- Neurological emergencies in the neonate generally present through altered mental status. This may be the result of:
  - Seizures
  - Hypoglycemia
  - Infection
  - Trauma
- Neonates may present with respiratory compromise from repeated seizures or central apnea.
- The primary treatment is management of symptoms and supportive care in accordance with the appropriate clinical practice guideline. In particular, seizures should be treated if paramedics and EMRs/FRs feel confident in their diagnosis, remembering that seizures can be subtle in neonates (e.g., lip smacking, blinking, and bicycle movement of the legs, are all common signs).

Additional Treatment Information

- The majority of neonates who experience respiratory compromise secondary to a neurological condition are treated as though they have an infectious encephalopathy until blood and cerebrospinal fluid cultures have been completed.
- Patients should be conveyed to a hospital with appropriate pediatric resources if there are multiple clinical pathways to choose from.
- Patients experiencing multiple apneic events may require placement of an advanced airway in order to oxygenation and ventilate effectively.

Interventions

First Responder

- Prevent heat loss
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Manual airway maneuvers
  - → B01: Airway Management
- Provide on-going care as per neonatal resuscitation guidelines
  - → M09: Neonatal Resuscitation

Emergency Medical Responder – All FR interventions, plus:

- Convey urgently to the closest facility
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider use of supraglottic airway if unable to oxygenate or ventilate with bag-valve mask alone
  - → PR08: Supraglottic Airway

- Correct documented hypoglycemia
  - → E01: Hypoglycemia and Hyperglycemia

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Advanced airway intervention if unable to oxygenate or ventilate
- MIDAZOLam for seizure control
- Consider need for vascular access based on clinical scenario
  - → D03: Vascular Access
- Consider intraosseous access
  - → PR12: Intraosseous Cannulation

M13: Neonatal Fluid and Glucose Management

Wes Bihlmayr

Updated: November 28, 2023
Reviewed: March 01, 2021

Introduction

Neonatal fluid and glucose management may involve a wide range of requirements, from general maintenance all the way to complete electrolyte replacement. The neonatal renal system does not reliably regulate electrolytes until sometime after the first 24 hours of life. During that time, fluid maintenance is primarily based on glucose replacement to meet the high metabolic demands of the neonate.

Essentials

- Neonatal blood glucose levels can be corrected with feeding, oral glucose, intramuscular glucagon, or intravenous dextrose.
  - Attempt to correct blood glucose using oral glucose first; be cautious with volumes and protect the airway to the maximal extent possible; rub small amounts of glucose gel on oral mucosa
  - If the neonate is asymptomatic: a blood glucose > 2.6 mmol/L requires ad lib feeds; if the blood glucose is 1.8-2.6 mmol/L, then a prescribed volume of feed every 2 hours is required
  - If the neonate is symptomatic or has a blood glucose < 1.8 mmol/l, an IV is required and an infusion of dextrose initiated; the normal starting solution is D10W at a rate of 3 ml/kg/hr if asymptomatic and 4 ml/kg/hr if symptomatic, with an additional consideration of a 2 ml/Kg D10W bolus
  - Once a neonate maxes out on fluid/dextrose volumes, the next step is to administer glucagon, 0.5 mg IM/SC
- Maintenance fluids for the first 24 hours should be D10W and after 24 hours D10W with NaCl (20 mmol/L)
  - DOL 0 – 60-80 ml/kg/day
  - DOL 1 – 80-100 ml/kg/day
  - DOL 2 – 100-120 ml/kg/day
  - DOL 3 – 120-140 ml/kg/day
  - DOL 4 – 140-150 ml/kg/day
  - DOL 5 – 150 ml/kg/day

General Information

- Out-of-hospital fluid management of the neonate should focus on glucose intake. D10W should be the fluid of choice. The fluid to use in a poor perfusion state is D10W with slow boluses of normal saline (10 ml/Kg).
- In general, the out-of-hospital neonate should only receive intravenous fluid if there are signs of poor perfusion or a symptomatic blood glucose level.

Interventions

First Responder

- Provide reassurance to parent(s) / carer(s)
- Maintain thermal stability
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
  - Manual airway maneuvers
- Positive pressure ventilation via bag-valve mask
  - → B01: Airway Management
  - Most pediatric airways can be effectively managed with proper positioning and an OPA/NPA (as per license level) and BVM without any requirements for further airway interventions. The gold standard for airway management is a self-maintained airway. Bag-valve mask is the preferred technique for airway management in pediatric resuscitation and is reasonable compared with advanced airway interventions (endotracheal intubation or supraglottic airway).

Emergency Medical Responder – All FR interventions, plus:

- Ongoing care as dictated by NRP
  - → M09: Neonatal Resuscitation
- Consider oral glucose
  - Oral 40% Glucose Gel
- Convey to the nearest hospital

Primary Care Paramedic – All FR and EMR interventions, plus:

- Correct documented hypoglycemia:
  - → E01: Hypoglycemia and Hyperglycemia
  - Glucagon

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider need for vascular access based on clinical scenario
  - → D03: Vascular Access
- Consider intraosseous access
  - → PR12: Intraosseous Cannulation

M03: Pediatrics - Respiratory Emergencies (superseded 2023-10-24)

Wes Bihlmayr

Updated: March 19, 2024
Reviewed: March 01, 2021

Introduction

This practice guideline contains changes related to COVID-19.

Respiratory conditions in children can be categorized into upper airway obstructions, lower airway obstructions, lower airway restrictive pathology, and disordered control of breathing.

Upper airway obstructions occur when there is an increased work of breathing due to an obstruction above the thorax. This can consist of a foreign body, tissue swelling, subglottic stenosis from previous intubation trauma, and the development of a tumour. Lower airway obstructions, by contrast, result from obstructive problems below the thorax: foreign bodies, and bronchial swelling or constriction.

Restrictions in the lower airways are a result of "stiffening" of lung tissue, caused by increased fluid accumulation from pulmonary edema, toxic exposure, allergic reactions, infiltration, and inflammation. Abdominal structures can also push on lung tissue, creating a restrictive condition.

Dysfunction within the respiratory center of the brain is responsible for the development of disordered breathing. These are more properly neurological problems with respiratory effects, and can include problems such as increased intracranial pressure, neuromuscular disease, and some poisonings and overdoses.

Essentials

- Upper airway obstruction can be an uncomfortable call to attend as many patients may look ill or unwell, but require purely comfort levels for treatment.
  - See → B04: Croup and Epiglottitis for additional information on the management of upper airway obstructions
- Lower airway obstruction results in an inability for the patient to get air out of the chest. This is usually due to excessive swelling or bronchospasm.
- Lower airway restrictive pathologies consist of numerous conditions that result in decreasing lung compliance or stiffening of the lung. The general management of these conditions concern correcting oxygenation and ventilation utilizing an escalation pathway of increasing FiO_2 via nasal cannula, face mask, heated HiFlow nasal cannula (2 L/min to a max of 60 L/min), NIV therapy, then intubation. Bronchospasm can be treated with a B_2 agonist.
- Disordered Control of Breathing are a series of conditions affecting the respiratory control center in the brain or neuromuscular diseases.

General Information

- Continuous salbutamol can decrease serum potassium.
- Ventilating the lower airway restrictive disease patient may require high peak inspired pressure of up to 32 cmH_2O and high PEEP of up to 10-15 cmH_2O. Diligent monitoring for the development of a pneumothorax is required.
- Succinylcholine should be avoided in the patient with neuromuscular disease due to the possibility of triggering hyperkalemia or malignant hyperthermia.

Interventions

First Responder

- Prevent heat loss but do not overheat the patient
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration
- Manual airway maneuvers as required
  - → B01: Airway Management
  - Most pediatric airways can be effectively managed with proper positioning and an OPA/NPA (as per license level) and BVM

without any requirements for further airway interventions. The gold standard for airway management is a self-maintained airway. Bag-valve mask is the preferred technique for airway management in pediatric respiratory emergencies and is reasonable compared with advanced airway interventions (endotracheal intubation or supraglottic airway).

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $SpO_2 \geq 94\%$
  - → A07: Oxygen Administration
  - For bronchospasm, reactive airway disease, and asthma:
    - Salbutamol
    - □□ EMR: Requires completion of scope expansion education.
- Convey with notification
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access and fluid administration (in patients ≥ 12 years of age)
  - → D03: Vascular Access
- Consider supraglottic airway to maintain airway patency; an iGel with a viral filter pre-connected before insertion must be utilized
  - → PR08: Supraglottic Airway
- For bronchospasm, reactive airway disease, and asthma:
  - Salbutamol via MDI
  - Consider intramuscular EPINEPHrine; epinephrine via intramuscular injection should be considered for a patient with SpO2 < 90% and moderate to severe symptoms of asthma that are unresolved with the use of salbutamol administered by MDIs
  - See → B03: Asthma and Bronchospasm for additional information
- For croup and epiglottitis
  - Croup: consider nebulized EPINEPHrine (NOT for epiglottitis)
  - See → B04: Croup and Epiglottitis for additional information

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider addition of ipratropium to supplement salbutamol
- Consider magnesium sulfate for significant and protracted bronchospasm
- Consider intraosseous cannulation if peripheral access is unavailable
  - → PR12: Intraosseous Cannulation
- Consider procedural sedation to facilitate airway management. Where SGAs and/or bag-valve mask ventilation fail to provide adequate oxygenation, tracheal intubation may be permissible in cases where paramedics are otherwise unable to obtain and maintain a patent airway. To be clear, this is for actual or immediately impending failure of airway patency unable to be managed by any other means other than intubation. CliniCall consultation required prior to attempting intubation.
  - → PR17: Procedural Sedation
- Consider intubation in patients whose airways cannot be managed through less invasive means
  - → PR18: Anesthesia Induction
- Decompress suspected tension pneumothorax
  - Out-of-hospital needle thoracentesis should be considered AGMP. Although this is a low occurrence procedure, it does potentially expose the paramedic to an increased risk of exposure. If this procedure is needed, crews are directed to proceed with airborne PPE including face-shield, EHFR/N95 mask, gown, and gloves.
  - → PR21: Needle Thoracentesis

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Mechanical ventilation (NIV and invasive)
- Chest tube maintenance
- Osmotic agents
- 3% Saline
- Infusion medication
- Antibiotic therapy

- Steroid therapy
- Nonselective adenosine receptor antagonist and phosphodiesterase inhibitor

Evidence Based Practice

Pediatric Wheeze/Bronchospasm

Supportive

- Anticholinergic
- Beta Agonist-MDI
- Beta Agonist-Nebulized
- Beta Agonist-Parenteral
- Epinephrine-Nebulized
- Epinephrine-Parenteral
- Hypertonic Saline-Nebulized
- Oxymetry Monitoring
- Steroids-Parenteral
- High flow nasal canula
- Ketamine

Neutral

- Magnesium Sulfate-IV
- Magnesium Sulfate-nebulized
- Oxygen-Humidified
- PEEP
- Steroids-Inhaled
- Steroids-Oral
- NiPPV
- ETCO2
- Temperature Monitoring

Against

Pediatric Stridor

Supportive

- Epinephrine-Nebulized
- Oxygen-Humidified
- Steroids-Oral

Neutral

Against

N01: Peri-Arrest Management

Jennie Helmer

Updated: December 19, 2023
Reviewed: December 19, 2023

Introduction

The peri-arrest period is the time either before or immediately following a full cardiac arrest, when the patient's condition is unstable. Paramedics and EMRs/FRs caring for a patient in the peri-arrest period (the so-called "crashing patient") have an opportunity to significantly improve outcomes in comparison to patients in cardiac arrest, provided they are able to recognize and respond to signs of imminent deterioration.

Essentials

A significant body of research demonstrates that many patients exhibit signs of clinical deterioration before experiencing cardiac arrest. The following features indicate that a patient is at high risk of being peri-arrest:

- Shock/hypotension (systolic blood pressure < 90 mmHg); pallor; sweating; cold, clammy extremities; confusion or impaired consciousness; poor oxygenation
- Syncope: transient loss of consciousness due to global reduction of blood flow to the brain
- Myocardial ischemia: typical ischemic chest pain and/or evidence of myocardial ischemia on 12-lead ECG
- Heart failure: pulmonary edema and/or raised jugular venous pressure
- Cardiac arrhythmias (relatively common in the peri-arrest period)

Additional Treatment Information

The specific clinical findings will dictate the need for appropriate immediate treatment in the peri-arrest period. Depending on the nature of any underlying arrhythmia and clinical status of the patient, in particular the presence or absence of adverse features, immediate treatment options for patients in the peri-arrest period can be divided into four categories:

1. No treatment needed
2. Simple clinical interventions (e.g., Vagal maneuvers)
3. Pharmacological therapies
4. Electrical therapies (e.g., cardioversion or pacing)

Most drugs act slowly, and less reliably, than electrical treatments, so defibrillation or cardioversion is generally preferred for unstable patients with adverse features. Once treated, paramedics must continue to assess and monitor the patient to detect any additional abnormalities that may require treatment.

Advanced Care Paramedics and above may consider the use of prophylactic antiarrhythmics following the successful termination of ventricular fibrillation or ventricular tachycardia. Although there are no studies that demonstrate improvement in long-term survival, the continued use of antiarrhythmic agents (particularly in cases where one was used to terminate a lethal arrhythmia) may be beneficial in maintaining a stable, perfusing rhythm and is supported by current American Heart Association Emergency Cardiovascular Care guidelines.

General Information

Non-technical skills such as leadership, teamwork, communication, and situational awareness, enables a more effective response to the deteriorating patient and are critical to ensuring an appropriate response to patients in the peri-arrest period.

If the patient is palliative or otherwise at the end of their life, treat in accordance with relevant clinical practice guidelines.

Interventions

First Responder

- Position patient supine, if appropriate; warning: do not ambulate the patient
- Supplemental oxygen as required:

- [→ A07: Oxygen Administration]
- The maximum flow of a nasal cannula should be 5 L/min. The maximum flow of a non-rebreather mask should be 15 L/min. A nasal cannula may be placed under an NRB, CPAP, or BVM when flow rates above 5 L/min are required.

- Position defibrillator electrodes in anticipation of cardiac arrest

Emergency Medical Responder – All FR interventions, plus:

- Use vital signs and patient observations to recognize deterioration, and to guide decision-making
- Supplemental oxygen as required to maintain $SpO_2 \geq 94\%$:
  - [→ A07: Oxygen Administration]
  - Paramedics and EMRs should use the lowest oxygen flow rate possible to achieve an SpO_2 of ≥ 94%. The maximum flow of a nasal cannula should be 5 L/min. The maximum flow of a non-rebreather mask should be 15 L/min. A nasal cannula may be placed under an NRB, CPAP, or BVM when flow rates above 5 L/min are required.
- Initiate conveyance to nearest emergency department with notification
- Consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Treat presenting symptoms per relevant BCEHS Clinical Practice Guidelines:
  - [→ D01: Shock]

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Treat presenting symptoms per relevant BCEHS Clinical Practice Guidelines:
  - [→ C02: Bradycardia]
  - [→ C03: Narrow Complex Tachycardia]
  - [→ C04: Wide Complex Tachycardia]

References

1. Massey D, et al. What factors influence ward nurses' recognition of and response to patient deterioration? An integrative review of the literature. 2017. [Link]
2. Panchal AR, et al. 2018 American Heart Association focused update on advanced cardiovascular life support use of antiarrhythmic drugs during and immediately after cardiac arrest: An update to the American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. 2018. [Link]

N02: Adult Cardiac Arrest

Jennie Helmer, Jade Munro, Adam Greene, Scott Haig, and Tim Makrides

Updated: December 19, 2023
Reviewed: December 19, 2023

Introduction

Sudden cardiac arrest (SCA) and sudden cardiac death (SCD) refer to the sudden cessation of cardiac activity and subsequent hemodynamic collapse. Victims of SCA manifest one of four electrical rhythms: ventricular fibrillation (VF), pulseless ventricular tachycardia (pVT), pulseless electrical activity (PEA), and asystole.

Ventricular fibrillation represents a disorganized electrical activity in the ventricles. Pulseless ventricular tachycardia is an organized electrical activity of the ventricles; neither VF nor pVT have any meaningful cardiac output. Pulseless electrical activity, as a term, encompasses a heterogeneous group of organized electrical rhythms that are associated with either an absence of mechanical activity, or mechanical activity that is insufficient to generate a detectable pulse. Asystole (more specifically ventricular asystole) represents the absence of detectable ventricular electrical activity, with or without atrial electrical activity.

Survival from these rhythms requires both effective basic life support (BLS) and a system of advanced cardiovascular life support (ACLS) with integrated post-cardiac arrest care. An understanding of the importance of diagnosing and treating underlying causes is fundamental to the management of all cardiac arrest rhythms. During a cardiac arrest, paramedics and EMRs/FRs should apply a systematic approach in searching for any factors that may have caused the arrest, or that may be complicating resuscitation efforts.

Essentials

- High quality chest compressions:
  - Paramedics, emergency medical responders, and first responders should use a ratio of 30:2 for compressions and ventilations when ventilating with a pharyngeal airway and bag-valve mask only
  - Continuous compressions may be used when an advanced airway is in place (i.e., supraglottic airway or endotracheal tube)
- Early rhythm analysis & defibrillation if indicated
- Appropriate airway management
- Recognition & correction of reversible causes:
  - Hypovolemia
  - Hypoxia
  - Hydrogen ion (acidosis)
  - Hypo/Hyperkalemia
  - Hypothermia (→ I01: Hypothermia)
  - Tension pneumothorax
  - Tamponade, cardiac
  - Toxins (including anaphylaxis)
  - Thrombosis, pulmonary
  - Thrombosis, coronary

Additional Treatment Information

- Once the absence of a pulse is established and chest compressions are started, subsequent pulse checks must only be done during periods of analysis, or if signs of spontaneous circulation are observed, such as coughing, movement, or normal breathing.
- Where clear signs of prolonged cardiac arrest are present, or where paramedics consider continued resuscitation futile, R02: Discontinuing Resuscitation should be consulted for additional guidance.

Referral Information

All patients in the cardiac arrest period should be treated in place with a consideration for immediate conveyance when reasonable.

General Information

- Available evidence suggests that several therapies or interventions, which have historically been used in resuscitation, should no longer be used routinely:
  - Atropine during PEA
  - Sodium bicarbonate
  - Calcium
  - Magnesium
  - Vasopressin (offers no advantage over epinephrine)
  - Fibrinolysis
  - Electrical pacing
  - Cricoid pressure
  - Precordial thump (associated with a delay in starting CPR and defibrillation)
  - Crystalloid infusion outside of specific reversible causes
- A rhythm change to one of organized electrical activity on the monitor is not an indicator for paramedics to pause chest compressions and assess for a pulse.
- Changes in $EtCO_2$ or signs of life are better indicators of a return of spontaneous circulation.
- During cardiac arrest, the provision of high quality CPR and rapid defibrillation are the primary goals. Drug administration is a secondary consideration.
  - After beginning CPR and attempting defibrillation as required, paramedics can attempt to establish vascular access, either intravenously or intraosseously - this should be performed without interrupting chest compressions
  - The primary purpose of IV/IO access during cardiac arrest is to provide drug therapy; it is reasonable for providers to establish IO access if IV access is not readily available
  - If IV or IO access cannot be established, epinephrine, vasopressin, and lidocaine may be administered endotracheally during cardiac arrest
  - Cardiac arrest resuscitations using tibial IO access appear to lead to worse outcomes when compared to IV access. Research to date demonstrates that drug delivery through IV and humeral IO sites are approximately the same with tibial being significantly worse. Definitive data does not yet exist though, so based on current information, we recommend the following practices:
    - A proximal IV is the preferred vascular access site for cardiac arrest resuscitation
    - For cases when an IV cannot be established, humeral IO is the next best option
    - Tibial IO should only be placed due to failure or delay in obtaining IV or humeral IO access
    - Consider external jugular cannulation where possible
  - Cardiac arrests related to opioid overdose are likely to be hypoxic in nature. Effective oxygenation, ventilation, and chest compressions are particularly critical for these patients. Naloxone is unlikely to be beneficial, and its use in cardiac arrest is not supported by current evidence.
  - Special consideration must be given to hypothermic patients without a pulse. As hypothermia progresses, the patient's respiratory and heart rate slow significantly. For this reason, breathing and pulse checks must be sufficiently long (60 seconds) to register very slow rates.
    - "Circum-rescue collapse" is a term that describes a death that occurs shortly before, during, or soon after rescue from exposure to a cold environment, usually cold water immersion. It often presents as an apparently stable, conscious patient who suffers ventricular fibrillation and cardiac arrest shortly thereafter.
    - A patient with a core body temperature below 30°C will most likely develop arrhythmias with progression to ventricular fibrillation.
    - Medications are more slowly metabolized in hypothermic patients; limit vasopressors to a maximum of 3 doses; refer to → I01: Hypothermia for additional information
  - Refer to N03: Return of Spontaneous Circulation for additional details on post-cardiac arrest care.

Interventions

First Responder

- Initiate high quality CPR:
  - Rate (100-120/min), **30:2 compression:ventilation ratio**
  - Depth: at least 5 cm (2 inches)
  - Ensure full chest recoil

- Minimize interruptions in compressions
- Relieve compressor every 2 minutes, or sooner if fatigued
- → PR06: High Performance CPR

- Defibrillation: Perform CPR while the defibrillator pads are being applied
  - Perform CPR while the defibrillator charges; as soon as energy is delivered, resume CPR for 2 minutes prior to reassessing rhythm
- Ventilation: Avoid excessive ventilation
  - Administer high-flow O_2 to patients requiring CPR
  - Consider appropriate airway adjunct
  - → A07: Oxygen Administration
  - → B01: Airway Management

Emergency Medical Responder – All FR interventions, plus:

- ClinCall consultation required, when possible, to discuss treatment plan.
- See also → R02: Discontinuing Resuscitation for additional information on resuscitation decision-making

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider placement of supraglottic airway when appropriate
  - → PR08: Supraglottic Airway
  - If required, the airway should be managed using an iGel with a viral filter pre-connected before insertion or 2 person bag-valve mask ventilation using a viral filter and a tight mask seal
  - Primary Care Paramedics are now permitted to use a modified approach to the in-built suction port available on all iGel supraglottic devices to provide pharyngeal suction during cardiac arrest
  - Where possible, do not interrupt chest compressions to enable placement of a supraglottic airway
  - With supraglottic airway in place, switch to continuous chest compressions where practical (ventilate every 6 seconds)
- Vascular access: Consider IV access when appropriate
  - → D03: Vascular Access

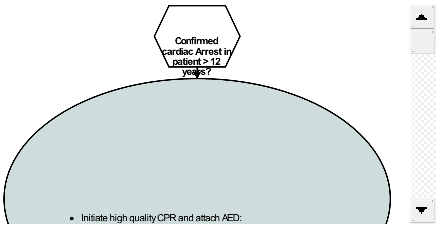
Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- CPR quality: Quantitative waveform capnography
  - If $ETCO_2$ < 10 mmHg, attempt to improve CPR quality
- Advanced airway: Consider advanced airway or front of neck access (FONA) if appropriate
  - Where possible, do not interrupt chest compressions to enable placement of a supraglottic airway
  - Waveform capnography or capnometry to confirm and monitor ETT placement
  - With endotracheal tube or supraglottic airway in place, switch to continuous chest compressions where practical (ventilate every 6 seconds)
- Vascular access: Consider IV/IO access when appropriate
  - → D03: Vascular Access
  - → PR12: Intraosseous Cannulation
  - → PR13: External Jugular Cannulation
- Drug therapy
  - EPINEPHrine: administer EPINEPHrine early in cases of asystole or PEA; defer EPINEPHrine administration until after the first defibrillation in VF/pVT
  - Amiodarone: administer amiodarone/lidocaine following the *second* defibrillation in VF/pVT
  - Lidocaine
- In the event of CPR induced consciousness, consider sedation
  - MIDAZOLam

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider additional reversible causes such as malignant hyperthermia, complications with anesthesia, and/or auto-PEEP
- Consider the use of ultrasound in patients receiving CPR to help assess myocardial contractility and to help identify potentially reversible causes of cardiac arrest such as hypovolemia, pneumothorax, pulmonary thromboembolism, or pericardial tamponade

Algorithm



Evidence Based Practice

General Cardiac Arrest Care

Supportive

- ACDC
- ACLS
- BCLS
- Bystander CCC
- Dispatch assisted CCC
- EMS provided CCC
- ETCO2 to determine ROSC
- Impedance Threshold Device
- ITD and ACDC
- NaHCO3-after long arrest
- Standard CPR
- Bystander CPR
- Continuous Oxymetry Monitoring
- Critical care life support
- Early epinephrine
- ETCO2 evaluation of ventilation
- ETCO2 for compression evaluation
- Family Involvement in Resuscitation
- Passive Oxygen Administration
- POCUS
- Redirect to ECMO facility
- Team based resuscitation
- Termination Resuscitation ALS
- Termination Resuscitation BLS
- Fluid Resuscitation

Neutral

- Chest Compression devices
- Compressions directly after Defib
- CPR feedback device
- Epinephrine
- Fibrinolysis

- High Dose Epi.
- Hypertonic Saline
- Intra-Arrest Cooling
- NaHCO3
- PAI-CPR/Defib
- Vasopressin
- ECG
- Precordial Thump
- Transport to an ECMO capable facility
- IV access
- Mechanical Intraosseous Insertion
- Prehospital Lactate

Against

- ETT Drug Admin.
- Manual Intraosseous Insertion

References

1. American Heart Association. 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care. 2015. [Link]
2. American Heart Association. 2020 American Heart Association guidelines for CPR and ECC. 2020. [Link]

Practice Updates

- 2023-12-19: removed COVID-related restrictions; reintroduced continuous chest compressions

N03: Return of Spontaneous Circulation

Kevin Hons

Updated: April 04, 2024
Reviewed: December 19, 2023

Introduction

Return of spontaneous circulation (ROSC) is the resumption of sustained perfusing cardiac activity following cardiac arrest. Regardless of the cause of the cardiac arrest, the hypoxemia, ischemia, and reperfusion that occur during cardiac arrest and resuscitation may damage multiple organ systems. The severity of this damage can vary widely among patients, and even among organ systems within individual patients.

Effective post–cardiac arrest care consists of identification and treatment of the precipitating cause of cardiac arrest, combined with the assessment and mitigation of ischemia and reperfusion injury to multiple organ systems. In the out-of-hospital environment, ROSC management is oriented towards maintaining appropriate oxygenation, ventilation, and hemodynamics, while attempting to identify the precipitating cause, and initiating rapid conveyance to hospital for further diagnostics and interventions.

Essentials

- Target oxygenation and ventilation to an SpO_2 of 92-98% and $EtCO_2$ of 30-40 mmHg.
- Avoid hypotension; the target systolic blood pressure is > 90 mmHg (or a mean arterial pressure > 65 mmHg).
- Limit fluid bolus to a maximum of 20 mL/kg unless treating suspected hypovolemia.
- Allow approximately 10 minutes of perfusion before attempting to acquire a 12-lead ECG.
- Elevate the head of cot to 30° where possible.
- Allow passive cooling via minimal blankets and using room temperature saline when fluid bolus is required; do not allow passive cooling in cases of traumatic cardiac arrest.
- Manage dysrhythmias in accordance with the appropriate CPG.
- Consult the Post Arrest Checklist for additional guidance.
- Consider the etiology of the cardiac arrest and treat according to appropriate CPG.

Additional Treatment Information

- Manage the airway in a staged approach based upon license level.
  - If the patient is able to maintain adequate oxygenation and is ventilating effectively, provide supplemental oxygen only. Titrate oxygen flow rates to the minimum required to maintain $SpO_2 \geq 94\%$. If pulse oximetry is unreliable because of peripheral perfusion deficits, use the highest available oxygen concentration.
  - Patients who remain comatose following a return of spontaneous circulation may have an advanced airway (either a supraglottic device or an endotracheal tube) placed. Maintain $EtCO_2$ between 30-40 mmHg. Monitor the patient for changes in level of consciousness, and consider the need for sedation or removal of the airway device should a gag reflex return.
- Hypotension may be managed with normal saline boluses up to 20 mL/kg as required. Large volumes of saline are associated with poor outcomes; paramedics should aim to maintain a systolic blood pressure of 100 mmHg (or a mean arterial pressure of 65 mmHg).
- EPINEPHrine is the preferred vasopressor in post-arrest care.
- The initial post-arrest phase can have bizarre and atypical cardiac rhythms. Treat sustained dysrhythmias in accordance with the appropriate guidelines. Allow at least 10 minutes following the return of spontaneous circulation for the rhythm to stabilize prior to acquiring a 12-lead ECG.
- Except in cases of traumatic cardiac arrest, allow for passive cooling.
- Elevating the head of bed to 30° promotes cerebral drainage and reduces the incidence of cerebral edema and aspiration.
- Check blood sugar and treat hypoglycemia accordingly.

Referral Information

Patients who have been resuscitated from cardiac arrest and who have an identified STEMI on 12-lead ECG, or who have a suspected cardiac cause of their arrest, should be conveyed to the closest PCI centre. If there is no PCI centre within a reasonable conveyance time, the closest hospital must be selected.

Post-arrest patients with suspected non-cardiac causes should be conveyed to the closest hospital.

General Information

- In patients who achieve ROSC after out-of-hospital cardiac arrest, subsequent morbidity and mortality are due largely to the cerebral and cardiac dysfunction that accompanies prolonged systemic ischemia. This syndrome, called the post cardiac arrest syndrome, comprises anoxic brain injury, post cardiac arrest myocardial dysfunction, systemic ischemia/reperfusion response, and persistent precipitating pathology.
- In-hospital treatment for post cardiac arrest syndrome will vary depending on the length of the cardiac arrest, the cause of the arrest, and the pre-existing co-morbidities of the patient.
- In a series in which consecutive post–cardiac arrest patients with a suspected cardiovascular cause were taken to coronary angiography, a coronary artery lesion amenable to emergency treatment was found in 96% of patients with ST elevation and in 58% of patients without ST elevation.
- Although targeted temperature management has been shown to be beneficial in post-arrest care in the hospital environment, there is no evidence to suggest that active out-of-hospital cooling has a positive effect on either survival or neurological recovery. Evidence has demonstrated that large infusions of cool normal saline can adversely affect outcomes.
- Hypothermia < 35°C has a negative effect on the clotting cascade and therefore should be avoided in ROSC following a traumatic cardiac arrest.
- The clamshell can be an excellent tool in extricating the non-traumatic post-arrest patient. Once the patient has been extricated to the stretcher, the clamshell should be removed to allow 30° head up positioning.

Interventions

First Responder

- OPA/BVM/O_2 as required
  - → A07: Oxygen Administration
  - Airway management by EMR and FR licensed responders who cannot insert an iGel should provide a tight seal with the BVM using a 2-person technique where possible; an inline viral filter should be used between the mask and the bag-valve device

Emergency Medical Responder – All FR interventions, plus:

- Oxygenation and ventilation
  - OPA/BVM/O_2 as required to maintain SpO_2 92-98%
    - → A07: Oxygen Administration
    - → B01: Airway Management
    - Airway management by EMR and FR licensed responders who cannot insert an iGel should provide a tight seal with the BVM using a 2 person technique where possible; an inline viral filter should be used between the mask and the bag-valve device.
- Head up 30° on cot
- Passive cooling
- Rapid conveyance
- Refer to Post-Arrest Checklist

Primary Care Paramedic – All FR and EMR interventions, plus:

- Oxygenation and ventilation
  - Consider Supraglottic Airway (SGA)
    - → PR08: Supraglottic Airway
    - If required, the airway should be managed using an iGel with a viral filter pre-connected before insertion or 2 person bag-valve-mask ventilation using a viral filter and a tight mask seal
- Hypotension
  - Establish IV access and administer fluid bolus
    - → D03: Vascular Access
- Refer to Post-Arrest Checklist

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Oxygenation and ventilation
  - Consider intubation early if not already done
  - Target SpO_2 to 92%-98%
  - End tidal CO_2 monitoring ($EtCO_2$): 35-45 mmHg
- Hypotension
  - Push dose EPINEPHrine
    - Target systolic blood pressure > 90 mmHg
    - Target mean arterial pressure > 65 mmHg
- Dysrhythmia
  - Treat as per appropriate CPG
- Perform 12-Lead ECG (minimum 10 minutes post-ROSC)
  - → PR16: 12-Lead ECG
- Refer to Post-Arrest Checklist

Evidence Based Practice

Post-Cardiac Arrest Care

Supportive

- Inotrope
- Antiarrhythmic - Class I (Na+ channel blockers)
- Optimal Trip Destination

Neutral

- Oxygen
- Oxygen-titrated
- Post-arrest cooling
- Post-Arrest Cooling (CCT)
- 12-Lead ECG

Against

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. Callaway CW, et al. Part 8: Post–cardiac arrest care: 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care. 2015. [Link]
3. Stub D et al. Post cardiac arrest syndrome: A review of therapeutic strategies. 2011. [Link]

Practice Updates

- 2023-12-19: removed COVID-related restrictions

N04: Traumatic Cardiac Arrest

Adam Greene and Scott Haig

Updated: December 19, 2023
Reviewed: December 19, 2023

Introduction

A traumatic cardiac arrest is a cardiac arrest that occurs secondary to either blunt or penetrating trauma. The most common cause of traumatic cardiac arrest is hemorrhage. Other causes include tension pneumothorax, cardiac tamponade, and hypoxemia. Although traumatic cardiac arrest has a high mortality rate, the neurological outcomes are better in those who survive compared to other causes of cardiac arrest. Patients who have some signs of life upon the arrival of paramedics or EMRs/FRs, or who initially present in pulseless electrical activity, and who subsequently achieve a return of spontaneous circulation, have the greatest probability of survival to hospital discharge.

Successful resuscitation requires simultaneous attention to assessment, airway management, and hemorrhage control.

Essentials

- Consider underlying medical causes of the cardiac arrest.
- Prioritize treatment of reversible causes over chest compressions in order of clinical precedence.
- Simultaneously attempt to identify and treat:
    - Hypovolemia
    - Hypoxemia
    - Tension pneumothorax
- Consider special circumstances.
- Consider discontinuing resuscitation efforts if interventions do not result in a return of spontaneous circulation.
- CliniCall consultation required to discuss treatment plan or early conveyance options.

Additional Treatment Information

- Interventions in traumatic cardiac arrests should be prioritized based on clinical relevance. Paramedics and EMRs/FRs should focus initially on controlling major hemorrhage through the appropriate use of direct pressure, tourniquets, and wound packing.
- Advanced airway management should not delay conveyance in urban areas where the traumatic arrest is the result of penetrating chest trauma, the presenting rhythm is PEA, and the time from loss of pulses to a trauma centre is less than 15 minutes (20 minutes in the Vancouver Coastal-Urban region).
- Bilateral needle thoracentesis should be performed on all traumatic arrests with blunt or penetrating chest trauma. The preferred site for needle thoracentesis is the 5th intercostal space in the mid-axillary line. An alternative site is the 2nd intercostal space on the mid-clavicular line, although this requires catheters longer than 5 cm.
- Obtain large-bore intravenous (or intraosseous) access and administer a bolus of 20 mL/kg.
- In blunt force cardiac arrest, a pelvic binder may be applied after addressing other reversible causes. If a pelvic fracture is suspected of being a significant contributing factor, the binder should be placed earlier.

Referral Information

- Triage according to the Pre-hospital Triage and Transport Guidelines for Adult and Pediatric Major Trauma decision tool, including Physiological Criteria, Anatomical Criteria, Mechanism of Injury Criteria, and Special Considerations.

General Information

- The primary etiologies targeted by out-of-hospital treatments include hypoxia, obstructive shock (specifically tension pneumothorax), and hypovolemia.
- Patients frequently present in an organized electrical rhythm on the monitor with no palpable pulses. It has been shown that in these situations, there is often a low perfusion state due to hypovolemia or vascular and cardiac obstruction preventing adequate perfusion. For management of major hemorrhage, volume replacement with large NS bolus or bilateral chest decompression may result in ROSC.

- Traumatic cardiac arrests with an initial rhythm of asystole or wide complex PEA of less than 40 beats per minute, are generally associated with poor outcomes. It is reasonable to consider early discontinuation of resuscitation if there is no response to treatment.

Interventions

First Responder

- Paramedics and EMRs/FRs are required to wear airborne PPE (N95/EHFR, face shield, gown, gloves) before initiating CPR and resuscitation. A surgical mask should be placed over the patient's face before initiating CPR. Defibrillation, when indicated, should be administered as early as possible. Airway management by EMR and FR licensed responders who cannot insert an iGel should provide a tight seal with the BVM using a 2 person technique where possible. Chest compressions should pause for ventilations using a 30:2 ratio. An inline viral filter should be used between the mask and the bag-valve device.
- Simultaneous on-scene correction of reversible causes:
  - Hypovolemia: control external hemorrhage, splint pelvis/fractures
  - Oxygenation: consider appropriate airway adjunct; maximize oxygenation
    - → A07: Oxygen Administration
- High quality CPR when practical:
  - Rate (100-120/min) continuous compressions
  - Depth: At least 5 cm (2 inches)
  - Ensure full chest recoil
  - Minimize interruptions of compressions
  - Relieve compressor every 2 minutes, or sooner if fatigued

Emergency Medical Responder – All FR interventions, plus:

- Consider primary medical cause – see N02: Adult Cardiac Arrest
- Prioritize treatment of reversible causes over chest compressions based on clinical need:
  - Tension pneumothorax (see H06: Chest Trauma)
  - Hypovolemia (see D01: Shock and D02: Bleeding)
  - Cardiac tamponade
- Consider recognition of life extinct – see R03: Recognition of Life Extinct
- Discontinue in cases of obvious death:
  - Transsection
  - Decapitation
  - Incineration
  - Cranial and cerebral destruction

For blunt traumatic cardiac arrest:

- Carefully review the history of the event. It can be difficult to determine if a medical event preceded the traumatic injury, or if severe trauma resulted in the cardiac arrest. Resuscitation is unlikely in patients with signs of major trauma, and the absence or loss of pulses and respiration (whether after the initial assessment and rapid trauma survey, or during conveyance). Contact CliniCall to discuss discontinuation instructions.
- Consider the possibility of an underlying medical cause in traumatic arrests that present with injuries consistent with lower levels of blunt force.

For penetrating traumatic cardiac arrest:

- This is a unique scenario where rapid surgical intervention may allow for control of a bleeding site and subsequent resuscitation. Time is critical: transport to a Lead Trauma Hospital *or* the closest emergency department if time of loss of pulse/respiration is **less than 15 minutes**. In cases where transport time is greater than 15 minutes, consult with CliniCall for discontinuation instructions.

If CliniCall is unreachable, and transport times exceed 15 minutes, discontinuation of resuscitation is appropriate regardless of whether the traumatic injuries are blunt or penetrating.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Simultaneous on-scene correction of reversible causes:
  - Hypovolemia
    - Establish vascular access, consider 20 mL/kg fluid bolus
      - → D03: Vascular Access
  - Oxygenation:
    - Consider supraglottic device
      - → PR08: Supraglottic Airway
    - If required, the airway should be managed using an iGel with a viral filter pre-connected before insertion or 2 person bag-valve mask ventilation using a viral filter and a tight mask seal

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Simultaneous on-scene correction of reversible causes:
  - Oxygenation
    - Consider supraglottic device, endotracheal intubation, or surgical airway
  - Tension pneumothorax
    - Bilateral needle thoracentesis

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Simultaneous on-scene correction of reversible causes:
  - Hypovolemia
    - Consider blood product resuscitation
  - Tension pneumothorax
    - Bilateral needle thoracostomy.
  - Pericardial tamponade
    - Pericardiocentesis

Evidence Based Practice

Traumatic Arrest

Supportive

- BVM
- Hemorrhage control
- HEMS
- Needle Decompression
- Thoracostomy
- Thoracotomy

Neutral

- Advanced airway
- Termination of Resuscitation (Blunt)
- Termination of Resuscitation (Penetrating)

Against

- Epinephrine
- Spinal immobilization

References

1. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
2. American College of Surgeons. Advanced Trauma Life Support Student Course Manual. 10th Edition. 2018. [Link]
3. Sinz E, et al. ACLS for Experienced Providers: Manual and Resource Text. 2015.

Practice Updates

- 2021-10-20: Added discontinuation and conveyance criteria to EMR interventions.
- 2023-12-19: removed COVID-related restrictions

P01: Palliative Care - General

Jennie Helmer

Updated: January 06, 2022
Reviewed: January 06, 2022

Introduction

Paramedics and EMRs/FRs are often called for emergency medical issues for people with life-limiting conditions. Access to, and availability of, comprehensive palliative care can be difficult, particularly in remote and rural areas of the province. When sudden changes occur, families can feel afraid or unsure how to support their loved one and often believe they have few options other than to call 9-1-1. Paramedics and EMRs/FRs provide a rapid response to medical emergencies, but traditionally assess, treat, and convey patients to hospital emergency rooms. For individuals in palliative care at home with their families, conveyance of the patient to an emergency department should be the exception rather than the rule. The person's wishes are usually to die at home; this should be confirmed at the time of interventions with the patient, family, or palliative care team.

Paramedics and EMRs providing palliative care should practice "relationship-based care" by adopting a humble, self-reflective clinical practice, and positioning themselves as a respectful and curious partner when providing care. In particular, paramedics and EMRs should seek to respect and learn about Indigenous (First Nations, Métis and Inuit) and different cultural approaches to palliative care, while reflecting on their own values and beliefs. Acknowledging the differences and the effect of personal values and beliefs one can have on others is an important step towards cultural humility.

Essentials

- The purpose of the palliative care clinical practice guidelines are to provide paramedics and EMRs with guidance in managing symptoms for people who are currently undergoing palliative care or end-of-life experience, and who call 911 due to new or escalating symptoms. These symptoms are most likely to be nausea and/or vomiting, pain, delirium or agitation, or dyspnea. Family members may also react to severe distress by calling 911 because they experience spiritual or emotional crisis from their loved one's suffering or changing status.
- Subcutaneous administration of drugs is most commonly used in the palliative patient population.
- Drug and non-drug therapies are equally important.
- Palliative care is an approach that aims to reduce suffering and improve the quality of life for people who are living with life-limiting illness.
- The intent of this care is to provide relief from distressing symptoms, not the treatment of any underlying disease process.
- Palliative care patients are sometimes conveyed to hospital by ambulance when they would have preferred to remain in their own home. The aim of the palliative care pathway is to ensure that palliative care patients receive the most appropriate care for their condition and remain in their own home as per their wishes, when appropriate.
- Patients approaching end of life may experience pain or other symptoms that cause severe distress. These symptoms are usually managed very well by appropriate interventions and medications administered by the primary care, community health, specialty palliative care teams, and sometimes by family members.
- Patients who are beneficiaries of the BC Palliative Care Benefits Program have a life expectancy of up to 6 months.
- Hospice services are available in many communities and can serve to offer additional services to people and their families.

Additional Treatment Information

- Consult with the patient's usual care team for the creation of a collaborative symptom management plan. If the patient's usual care team is not available, contact the After Hours Palliative Nursing Service (AHPNS - contact phone number varies based on location). If neither is available or the patient is not under a care team, contact CliniCall for the creation of a collaborative symptom treatment plan.
- Where the patient has not followed their symptom management plan, paramedics and EMRs may encourage the patient or carer to administer any medications recommended as part of that plan, prior to management under this guideline. Paramedics can only administer the patient's own medications where the symptom management plan is clear, they are trained and experienced in the technique of administration, and where such administration is within the scope of practice for their license. Paramedics should not use in situ subcutaneous access devices unless they are educated in their use.
- A patient may be recognized as a palliative patient or at end-of-life by one or more of the following:
  - Diagnosed with a life limiting illness
  - Care is currently focused on comfort and symptom management rather than curative interventions
  - Goals of Care Designation consistent with treatment in place

  - Under care of a physician and/or home care providing palliative care services

Referral Information

All palliative/end-of-life patients can be considered for inclusion with the BCEHS Palliative Care Clinical Pathway (treat and refer) approach to care. EMRs are required to contact CliniCall for consultation to proceed with the ASTaR clinical pathway.

General Information

Refer to the Palliative Care Clinical Pathway for a complete explanation

- If there is a medication directive for the patient that is signed by their GP, the patient is in the home, and the medications prescribed for the required symptoms are available, consider supporting the family in the administration of the medication prescribed for that symptom as per the directive, in accordance with BCEHS policy and license scope of practice.
- If there is no medication directive for the patient in the home:
  - Contact the patient's palliative care team (if available) and identify a collaborative care plan
  - If neither the patient's usual care team nor the After Hours Palliative Nursing Service is available, contact CliniCall for the creation of a collaborative symptom treatment plan.
  - Follow the appropriate BCEHS palliative care CPG to manage the symptom
  - Consider conveyance to ED if the symptoms cannot be managed at home and this is the expressed preference of the individual and family
- Provide appropriate support to the family members present.
- Recognize when patients are entering the final stages of life.
- Reassess the patient to ensure the patient's needs are met and the treatment provided meets the goals of care.
- Complete an ePCR and ensure documentation follows the palliative clinical pathway requirements.
- If patient goals of care are available, ensure a photo of the document (e.g., advanced care plan, 'do not resuscitate' instruction, medical order for scopes of treatment, goals of care) is uploaded to the ePCR.
- EMRs are required to contact CliniCall for consultation to proceed with the ASTaR clinical pathway.

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. BC Centre for Palliative Care. B.C. Inter-Professional Palliative Symptom Management Guidelines. 2017. [Link]
4. Nova Scotia Health Authority. Nova Scotia Palliative Care Competency Framework. 2017. [Link]
5. Pallium Canada. Learning Essentials Approach to Palliative Care. 2019. [Link]

Practice Updates

- 2022-01-06: EMRs now authorized to access ASTaR clinical pathway.

P02: Palliative Care - Delirium

Jennie Helmer

Updated: January 06, 2022
Reviewed: January 06, 2022

Introduction

Delirium is a syndrome of abrupt fluctuating disturbances in attention and awareness that represents a change from baseline status. It is typified by cognitive dysfunction along with changes in psychomotor behaviour, mood, sleep-wake cycle, and may include hallucinations. Delirium can be either hypoactive, hyperactive, or mixed. It is a common phenomenon in palliative care, occurring in anywhere from 20% to 88% of cancer patients.

Although delirium often occurs 24 to 48 hours before death, it should not be considered a normal part of the dying process. Management of delirium symptoms may allow for a more peaceful death. Prompt recognition and treatment of delirium is essential to improve patient and family outcomes.

Essentials

- Establish goals of care in consultation and conversation with the patient, family, and care team.
- Prevent over-stimulation and promote relaxation.
- Avoid the use of physical restraints as they can increase the risk of delirium.

Referral Information

All palliative and end-of-life patients can be considered for inclusion in the Palliative Care Clinical Pathway (treat and refer) approach to care. Paramedics must complete required training prior to applying this pathway. EMRs are required to contact CliniCall for consultation to proceed with the ASTaR clinical pathway.

General Information

- The signs and symptoms of hyperactive delirium may include:
  - Attention disturbances
  - Restlessness and agitation
  - Hallucinations
- Signs and symptoms of hypoactive delirium may include:
  - Drowsiness
  - Emotional or physical withdrawal
  - Depression
  - Lethargy
  - Decreased levels of consciousness
- Common causes of delirium:
  - Sepsis
  - Metabolic or electrolyte disturbances
  - Hypoxia
  - Organ failure
  - Withdrawal from alcohol or medications
  - Unmanaged or undermanaged pain
  - Sleep deprivation
  - Constipation or urinary retention
  - Dehydration
  - Changes to the patient’s environment or psychosocial situation

Interventions

First Responder

- Provide reassurance
- Provide supplemental oxygen if hypoxia is a potential cause of delirium
- Prevent over-stimulation and promote relaxation; consider repositioning

Emergency Medical Responder – All FR interventions, plus:

- Establish goals of care in consultation and conversation with the patient, family, and care team
- Prevent over-stimulation and promote relaxation; consider repositioning
- Reassure the patient

Primary Care Paramedic – All FR and EMR interventions, plus:

- Assist family with the administration of any medications that are recommended as part of an established care plan
  - Paramedics can only administer the patient's own medications where the symptom management plan is clear, they are trained and experienced in the technique of administration, and are operating within BCEHS scope
  - CliniCall consultation required prior to initiating treatment.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- If the patient has delirium and agitation that is moderate to severe (RASS +2 to +4), is unmanageable, pose concerns of harm to self/caregivers, and/or is causing distress to the patient and family:
  - First line:
    - MIDAZOLam SC for temporary sedation
    - Lorazepam 1 mg SL (only if prescribed for patient); ACP must have appropriate Schedule 2 (4(b)) license endorsement;
      - CliniCall consultation required prior to administration of lorazepam
  - Second line:
    - KetAMINE SC/IM
- Patients requiring MIDAZOLam or ketAMINE for management of agitation should have a follow-up from their palliative care team; if care team unable to attend within an acceptable time frame, consider conveyance to hospital for further support

Evidence Based Practice

Agitation

Supportive

- Haloperidol
- Ketamine

Neutral

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. BC Centre for Palliative Care. B.C. Inter-Professional Palliative Symptom Management Guidelines. 2017. [Link]
4. Nova Scotia Health Authority. Nova Scotia Palliative Care Competency Framework. 2017. [Link]
5. Pallium Canada. Learning Essentials Approach to Palliative Care. 2019. [Link]
6. Pre-Hospital Emergency Care Council. Palliative Care by PHECC registered practitioners. 2016. [Link]
7. University of Colorado Denver. Delirium & RASS. 2002. [Link]

Practice Updates

- 2022-01-06: EMRs now authorized to access ASTaR clinical pathway.

P03: Palliative Care - Pain

Jennie Helmer

Updated: September 29, 2023
Reviewed: September 29, 2023

Introduction

Pain is a common palliative or end-of-life complaint in patients seeking treatment in the out-of-hospital environment. It can be well controlled in up to 90% of patients using standard therapies, but remains under-recognized and under-treated in many palliative scenarios.

The objective of care is to reduce suffering associated with the experience of pain and to improve patient comfort. The adequacy of analgesia may be assessed through a variety of mechanisms, including physiological signs of pain, verbal numerical ratings, and overall appearance (whether distressed or not). Frequent reassessment and repeat administrations of medication are essential components of pain management.

Essentials

- Establish goals of care in consultation and conversation with the patient, family, and care team.
- The total daily dose is the 24-hour total of a specific drug that is taken for regular and breakthrough pain.
- Breakthrough pain is a transient exacerbation of pain against a background of relatively stable and adequately controlled pain.
- The breakthrough or rescue dose is an additional dose of medication used to control breakthrough pain. It does not replace or delay the next routinely scheduled dose. Breakthrough doses of pain medication are generally 10% of the total regular daily opioid dose.
- Paramedics and EMRs should consider referring patients with pain emergencies to acute hospital care for treatment of the underlying cause. Pain emergencies include fractures, spinal cord compression, superior vena cava obstruction, and an obstructed or perforated viscus.

Additional Treatment Information

- Treatment of pain is guided by use of the 0-10 pain intensity scale.
- The dose of subcutaneous morphine to be administered can be calculated by converting each of the patient's regular opioid analgesics to a total equivalent daily dose of oral morphine.
  - Where the total equivalent daily dose of oral morphine is < 50 mg, the patient should receive morphine 2.5 mg subcutaneously
  - Where the total equivalent daily dose of morphine of oral morphine is > 50 mg, 10% of that dose will be calculated and converted to a subcutaneous dose
  - Calculated doses of morphine > 10 mg should be discussed with the clinician
  - The maximum subcutaneous dose of morphine is 20 mg; consult Clinicall and/or convey to hospital for patients who do not respond to this dose (1-833-829-4099)
- Breakthrough Dosing Principles:
  - Breakthrough doses are generally 10% of the total regular daily opioid dose
  - Use immediate release opioids every hour orally or every 30 minutes subcutaneously PRN
  - Use of the same opioid for breakthrough pain doses and the regularly scheduled opioid improves the ease and clarity for determining future dose titrations
  - Reassess when 3 or more breakthrough doses are used per 24 hours (see titration section)
- Titration Principles:
  - Calculate total daily dose (TDD) for the past 24 hours
    - TDD = Regular dose + all breakthrough doses (BTD)
- Regular dose every 4 hours for the next 24 hours = past TDD/6
- Breakthrough dose (BTD) = new regular dose X 10%. Increase the opioid proportionally whenever the regular dose is increased.

Referral Information

All palliative and end-of-life patients can be considered for inclusion in the Palliative Care Clinical Pathway (treat and refer) approach to care. Paramedics must complete required training prior to applying this pathway. EMRs are required to contact CliniCall for consultation to proceed with the ASTaR clinical pathway.

Interventions

First Responder

- Provide reassurance
- Promote non-pharmacological pain strategies such as positioning and reassurance

Emergency Medical Responder – All FR interventions, plus:

- Establish goals of care in consultation and conversation with the patient, family, and care team
- Complete a comprehensive pain assessment
  - For those unable to communicate verbally, assess for restlessness, rigidity, grimacing, and distressed vocalizations
- Consider nitrous oxide
  - Provision of short-term pain relief should be in conjunction with planning for longer-term pain management

Primary Care Paramedic – All FR and EMR interventions, plus:

- Assist family with the administration of any medications that are recommended as part of an established care plan
- Paramedics can only administer the patient’s own medications where the symptom management plan is clear, they are trained and experienced in the technique of administration, and are operating within BCEHS scope
- CliniCall consultation required prior to initiating treatment.
- Consider acetaminophen (patient pain rating of 1 to 6/10)
- □□ **Requires completion of PCP scope expansion education:**
  - For severe (7/10 to 10/10) pain
    - MORPHine SC
    - HYDROmorphone SC

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- For severe (7/10 to 10/10) pain:
  - First line:
    - Oxycodone PO
  - Second line:
    - KetAMINE SC or IN
- Consider the patient's usual opioid regimen and whether opioid naïve
- The patient's own prescribed pain medication may be administered if the ACP has completed the appropriate Schedule 2 (4(b)) license endorsement
- CliniCall consultation required prior to the administration of any out-of-scope medications.

Evidence Based Practice

Analgesia

Supportive

- Fentanyl
- Morphine
- Hydromorphone
- Oxycodone
- Topical Narcotic

Neutral

- Acetaminophen
- Corticosteroids

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. BC Centre for Palliative Care. B.C. Inter-Professional Palliative Symptom Management Guidelines. 2017. [Link]
4. Nova Scotia Health Authority. Nova Scotia Palliative Care Competency Framework. 2017. [Link]
5. Pallium Canada. Learning Essentials Approach to Palliative Care. 2019. [Link]
6. Pre-Hospital Emergency Care Council. Palliative Care by PHECC registered practitioners. 2016. [Link]
7. University of Colorado Denver. Delirium & RASS. 2002. [Link]

Practice Updates

- 2023-09-29: updated PCP interventions
- 2022-01-06: EMRs now authorized to access ASTaR clinical pathway.

P04: Palliative Care - Dyspnea

Jennie Helmer

Updated: January 06, 2022
Reviewed: March 01, 2021

Introduction

Dyspnea is the uncomfortable feeling of being short of breath. By definition, it is a subjective sensation and may or may not be associated with hypoxia. The prevalence of dyspnea in palliative patients is high and the intensity of the sensation tends to worsen towards the end of life. Opioids are the first-line pharmacological therapy, but several other, non-medication-based therapies exist.

Essentials

- Establish goals of care in consultation and conversation with the patient, family, and care team.
- Dyspnea may not necessarily be due to hypoxia. Improving airflow to the patient with fans can sometimes be as effective as oxygen administration. Paramedics and EMRs should focus on relaxation and other non-pharmacological techniques before escalating to medications.
- Sit the patient upright, avoiding compression of the chest and abdomen. Consider positions that allow optimal lung expansion. If the patient cannot tolerate sitting upright, positioning with the affected (i.e., poorly ventilating) lung down may relieve the sensation of breathlessness.
- In cancer patients who are dyspneic, consider opioids as a first-line agent.
- Oxygen is generally only required in hypoxic patients.

Additional Treatment Information

- Subcutaneous morphine can be given to alleviate the sensation of dyspnea.
  - The dose of subcutaneous morphine is calculated by converting each of the patient's regular opioid analgesics to a total equivalent daily dose of morphine
    - See https://ipalapp.com/manage/dyspnea/ for additional information on equianalgesic calculations
  - If the patient is not prescribed morphine, begin with 2.5 mg SC
  - Where the total equivalent daily dose of morphine is over 50 mg, 10% of the dose can be converted to and given as a subcutaneous dose
    - The maximum subcutaneous dose of morphine is 20 mg; consultation should be sought in cases where patients do not experience relief from these doses and conveyance should be considered
  - Calculated doses of morphine in excess of 10 mg should be discussed with a clinician, either as part of the palliative care team or through CliniCall (1-833-829-4099)
  - If the patient is unable to have morphine, an equivalent does of fentanyl should be administered
    - As an example, 2.5 mg of morphine is equivalent to 25 mcg of fentanyl; 20 mg of morphine is equivalent to 200 mcg of fentanyl

Referral Information

All palliative and end-of-life patients can be considered for inclusion in the Palliative Care Clinical Pathway (treat and refer) approach to care. Paramedics must complete required training prior to applying this pathway. EMRs are required to contact CliniCall for consultation to proceed with the ASTaR clinical pathway.

Interventions

First Responder

- Provide reassurance
- Promote non-pharmacological pain management strategies such as repositioning to more upright postures, relaxation, and reassurance

- Provide supplemental oxygen in cases of significant breathlessness
- Consider the use of alternative strategies to reduce shortness of breath (fans, windows, and improved airflow)

Emergency Medical Responder – All FR interventions, plus:

- Establish goals of care in consultation and conversation with the patient, family, and care team
- Complete a comprehensive dyspnea assessment
- Provide supplemental oxygen in cases where $SpO_2 \leq 94\%$ or differ significantly from patient's normal oxygen saturation
- Apply other methods to provide fresh air when SpO_2 measurements do not indicate hypoxia; fans, windows, and improved airflow should be attempted for at least five minutes

Primary Care Paramedic – All FR and EMR interventions, plus:

- Assist family with the administration of any medications that are recommended as part of an established care plan
  - Paramedics can only administer the patient's own medications where the symptom management plan is clear, they are trained and experienced in the technique of administration, and are operating within BCEHS scope
  - CliniCall consultation required prior to initiating treatment.
- Consider salbutamol for suspected bronchospasm

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- In moderate to severe dyspnea:
  - Consider ipratropium
  - Consider mORPHine SC
  - Consider MIDAZOLam SC for anxiety
- Titrate opioid dose incrementally by 25% according to effectiveness and PRN usage in prior 24 hours; goal is patient comfort

Evidence Based Practice

Breathlessness

Supportive

- Narcotic

Neutral

- Oxygen

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. BC Centre for Palliative Care. B.C. Inter-Professional Palliative Symptom Management Guidelines. 2017. [Link]
4. Nova Scotia Health Authority. Nova Scotia Palliative Care Competency Framework. 2017. [Link]
5. Pallium Canada. Learning Essentials Approach to Palliative Care. 2019. [Link]
6. Pre-Hospital Emergency Care Council. Palliative Care by PHECC registered practitioners. 2016. [Link]

P05: Palliative Care - Nausea

Jennie Helmer

Updated: September 29, 2023
Reviewed: September 29, 2023

Introduction

Nausea and vomiting can profoundly affect the quality of life for palliative patients. The prevalence of nausea and vomiting is high in this group, affecting 40-60% of all individuals receiving palliative care. Gastroparesis and chemical disturbances are the most common cause.

Essentials

- Establish goals of care in consultation and conversation with the patient, family, and care team.
- Non-pharmacological interventions provide the best relief for mild and moderate nausea and vomiting.
- Keep air and room fresh; eliminate strong odors.
- Nausea and vomiting are separate, but related, phenomena that are present in many life-limiting conditions.

Additional Treatment Information

- A single dose of antiemetic is sufficient in the majority of patients.
- Antiemetics tend to suppress vomiting more readily than nausea. An increase in the antiemetic dose may improve control of nausea.

Referral Information

All palliative and end-of-life patients can be considered for inclusion in the Palliative Care Clinical Pathway (treat and refer) approach to care. Paramedics must complete required training prior to applying this pathway. EMRs are required to contact CliniCall for consultation to proceed with the ASTaR clinical pathway.

General Information

- Underlying causes can be classified into 6 broad groups:
  - Chemical
  - Cortical
  - Cranial
  - Vestibular
  - Visceral
  - Gastric stasis (impaired gastric emptying)

Interventions

First Responder

- Provide reassurance
- Promote fresh air in the patient’s room and eliminate strong odors where possible
- Promote non-pharmacological pain strategies such as positioning and reassurance

Emergency Medical Responder – All FR interventions, plus:

- Establish goals of care in consultation and conversation with the patient, family, and care team
- Complete a comprehensive nausea and vomiting assessment

Primary Care Paramedic – All FR and EMR interventions, plus:

- Assist family with the administration of any medications that are recommended as part of an established care plan
  - Paramedics can only administer the patient’s own medications where the symptom management plan is clear, they are trained and experienced in the technique of administration, and are operating within BCEHS scope
  - CliniCall consultation required prior to initiating treatment.
- For mild nausea, consider dimenhyDRINATE PO/SC
  - □□ **Requires completion of PCP scope expansion education:**
  - Consider ondansetron PO/SC
- Consider intravenous fluids as appropriate to correct hypotension or dehydration
  - CliniCall consultation recommended to discuss care planning options.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Paramedics should not use in situ subcutaneous access devices unless they are educated in their use and within their scope of practice
- For moderate to severe nausea, consider
  - Metoclopramide 5 mg SC
  - Paramedics should consider patient’s existing regimen of drugs; ACPs may administer a patient's own prescribed medication only if the ACP has completed the appropriate Schedule 2 (4(b)) license endorsement
  - CliniCall consultation required prior to the administration of any out-of-scope medications.

Evidence Based Practice

Nausea

Supportive

- Levomepromazine
- Metoclopramide

Neutral

- Antidopaminergic
- Ondansetron/Granisetron
- Scopolamine

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. BC Centre for Palliative Care. B.C. Inter-Professional Palliative Symptom Management Guidelines. 2017. [Link]
4. Nova Scotia Health Authority. Nova Scotia Palliative Care Competency Framework. 2017. [Link]
5. Pallium Canada. Learning Essentials Approach to Palliative Care. 2019. [Link]
6. Pre-Hospital Emergency Care Council. Palliative Care by PHECC registered practitioners. 2016. [Link]

Practice Updates

- 2023-09-29: updated PCP interventions
- 2022-01-06: EMRs now authorized to access ASTaR clinical pathway.

P06: Palliative Care - Secretions

Jennie Helmer

Updated: January 06, 2022
Reviewed: January 06, 2022

Introduction

Secretions and respiratory congestion produce noisy breathing as the movement of mucus and phlegm disrupts the flow of air in the upper airway. Patients who are dying, or who have reduced levels of consciousness or profound weakness, often suffer from excessive oral secretions from the salivary glands. These secretions predict death for up to 75% of patients, often within 48 hours of onset. Bronchial secretions can be caused by respiratory pathologies such as lung infections, aspiration, or pulmonary edema.

Secretions are a common, and expected, symptom in the dying patient. Although the sound can be distressing to family and practitioners, there is no evidence that the sound alone is associated with respiratory distress.

Essentials

- Establish goals of care in consultation and conversation with the patient, family, and care team.
- Although the sound of respiratory congestion can be disturbing to hear, determine if the patient is distressed by observing other indications, such as wincing, and provide reassurance to the family.
- If the patient seems distressed from their secretions, start medication early for best effect.
- Positioning is the most effective non-pharmacological intervention. Reposition the patient in a side-lying position with the head of the bed elevated.
- Deep suctioning may not relieve congestion. However, in the event of copious secretions in the oropharynx, gentle anterior suction may be helpful.

Additional Treatment Information

- Oxygen has no known patient benefit for respiratory congestion.
- Anticholinergics may be more effective when started early, as these drugs do not dry up secretions that are already present.

Referral Information

All palliative and end-of-life patients can be considered for inclusion in the Palliative Care Clinical Pathway (treat and refer) approach to care. Paramedics must complete required training prior to applying this pathway. EMRs are required to contact CliniCall for consultation to proceed with the ASTaR clinical pathway.

Interventions

First Responder

- Provide reassurance
- Positioning (side-lying with the head of the bed elevated) is the most effective non-pharmacological intervention

Emergency Medical Responder – All FR interventions, plus:

- Establish goals of care in consultation and conversation with the patient, family, and care team; inform families that noisy breathing may occur as a normal part of the dying process

Primary Care Paramedic – All FR and EMR interventions, plus:

- Assist family with the administration of any medications that are recommended as part of an established care plan
  - Paramedics can only administer the patient's own medications where the symptom management plan is clear, they are trained and experienced in the technique of administration, and are operating within BCEHS scope
  - CliniCall consultation required prior to initiating treatment.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider atropine IM
- Consider glycopyrrolate IM
- ACPs may administer a patient's own prescribed medication only if the ACP has completed the appropriate Schedule 2 (4(b)) license endorsement;
- CliniCall consultation required prior to the administration of any out-of-scope medications.

Evidence Based Practice

Secretions

Supportive

Neutral

Against

References

1. Alberta Health Services. AHS Medical Control Protocols. 2020. [Link]
2. Ambulance Victoria. Clinical Practice Guidelines: Ambulance and MICA Paramedics. 2018. [Link]
3. BC Centre for Palliative Care. B.C. Inter-Professional Palliative Symptom Management Guidelines. 2017. [Link]
4. Nova Scotia Health Authority. Nova Scotia Palliative Care Competency Framework. 2017. [Link]
5. Pallium Canada. Learning Essentials Approach to Palliative Care. 2019. [Link]
6. Pre-Hospital Emergency Care Council. Palliative Care by PHECC registered practitioners. 2016. [Link]

Practice Updates

- 2022-01-06: EMRs now authorized to access ASTaR clinical pathway.

P07: Palliative Care - End of Life

Jennie Helmer

Updated: January 06, 2022
Reviewed: January 06, 2022

Introduction

Patients who are at the end of their lives can be recognized by one or more of the following features:

- The patient is diagnosed with a life-limiting illness
- Care is currently focused on comfort and symptom management, rather than curative interventions
- The patient has a current document outlining their goals for care
- The patient is under the care of a physician or a home care team providing palliative care services

When death is imminent, the individual may be provided with supportive care and comfort measures, with the goal of avoiding medical interventions where appropriate.

Essentials

- Establish goals of care in consultation and conversation with the patient, family, and care team.
- It is important to recognize that dying may take hours or days and to diagnose dying is a complex process.
- Imminent death can sometimes be recognized by any, none, or all of the following:
  - Patient uncommunicative, unresponsive, and difficult to arouse
  - Cold, purple, blotchy feet and hands
  - Drowsiness or impaired cognition
  - Decreased urine output
  - Restlessness
  - Congestion and gurgling in the chest
  - Alterations in breathing patterns

Additional Treatment Information

- When death is imminent, the patient may be provided with supportive care such as positioning, suctioning, or fans as necessary. Avoid medical interventions when appropriate.
- *Integrity in palliative care practice* refers to the importance of respecting the patient's values, needs, and wishes in the context of a life-limiting condition.
- Recognize and respect that people may have a spiritual and/or religious belief for end-of-life care and that such beliefs may be different from that of paramedics and EMRs/FRs.
- For patients nearing the end of their lives, transfer to the ED can be inappropriate.
- When a clear 'Do Not Resuscitate' (DNR) or 'Medical Orders for Scope of Treatment' (MOST) instruction is in place, paramedics and EMRs/FRs should not start resuscitation when the patient progresses to respiratory or cardiac arrest. CliniCall consultation required for guidance if clear documentation is not available (e.g., a verbal do-not-resuscitate order).
- Follow the BCEHS procedure for pronouncing death of the patient.
- Witnessing the end of life often elicits a variety of responses from those present. Cultural beliefs, age, and the nature of the incident may influence the response.
- Once the decision to withhold or discontinue resuscitation has been made, be prepared to console the family, friends, or bystanders at the moment of death.
- Allow the family space to grieve and, when appropriate, attempt to cover the body and close the patient's eyes.

Referral Information

All palliative and end-of-life patients can be considered for inclusion in the Palliative Care Clinical Pathway (treat and refer) approach to care. Paramedics must complete required training prior to applying this pathway. EMRs are required to contact CliniCall for consultation to proceed with the ASTaR clinical pathway.

Interventions

First Responder

When death is imminent, the individual may be provided with supportive care and comfort measures, with the goal of avoiding medical interventions where appropriate.

References

1. Nova Scotia Health Authority. Nova Scotia Palliative Care Competency Framework. 2017. [Link]
2. Pallium Canada. Learning Essentials Approach to Palliative Care. 2019. [Link]
3. Harman SM, et al. Palliative care: The last hours and days of life. In UpToDate. 2020. [Link]

Practice Updates

- 2022-01-06: EMRs now authorized to access ASTaR clinical pathway.

P08: Medical Assistance in Dying (MAID)

Jennie Helmer
Updated: April 1, 2020
Reviewed:

Introduction

In June 2016, the federal government amended the Criminal Code and passed Bill C-14, providing legal protection for persons who aid physicians and nurse practitioners who supply services for medical assistance in dying (MAiD).

This new legislation includes the protection of paramedic practitioners. Paramedics and EMRs are categorized alongside other healthcare professionals and are provided further protection under sections 241 (5.1) and 227 (2) of the Criminal Code: 241(5.1).

Definitions:

Medical assistance in dying is defined as:

> Medical assistance in dying occurs when an authorized doctor or nurse practitioner provides or administers medication that intentionally brings about a person's death, at that person's request. This procedure is only available to eligible patients.

Bill C-14 defines a medical practitioner as a person who is entitled to practice medicine under the laws of the province (e.g., physician).

Liability:

Only physicians or nurse practitioners are enabled to determine and confirm that a patient is eligible for the MAiD program. The patient must meet all the criteria in order to receive MAiD:

- Be eligible for health services publicly funded by a government in Canada;
- Be at least 18 years old and capable of making decisions about their health; ☐
- Have made a voluntary request for MAID that, in particular, was not made as a result of external pressure;
- Have given informed consent to receive MAiD after being informed of the means that are available to relieve their suffering, including palliative care; and
- Have a grievous and irremediable medical condition

Guidelines

Under Bill C-14, paramedics and EMRs are categorized alongside other healthcare professionals and are provided further protection under sections 241 (5.1) and 227 (2) of the Criminal Code: 241(5.1). For greater certainty, no social worker, psychologist, psychiatrist, therapist, medical practitioner, nurse practitioner, or other healthcare professional commits an offence if they provide information to a person on the lawful provision of medical assistance in dying: 227(2). No person is party to a culpable homicide if they do anything for the purpose of aiding a medical practitioner or nurse practitioner to provide a person with medical assistance in dying in accordance with section 241.2.

Under the Emergency Health Services Act, the Emergency Medical Assistants Licensing Board (EMALB) is responsible for examining, registering, and licensing all EMAs in British Columbia. The Board, under the authority of the Emergency Health Services Act, sets license terms and conditions. The EMALB policy is that a qualified EMA may initiate an intravenous line that has been ordered by a physician or nurse practitioner for MAiD. An EMA may not administer medication for MAID under any circumstance.

Given the nature of paramedic practice, it is anticipated that BCEHS paramedics will be called to assist with a MAiD event. In these circumstances, it is expected that the paramedic practices within their defined scope of practice and in accordance with the Code and all legislations, EMALB policies, and BCEHS operational scope of practice. BCEHS recognizes the complexity of MAiD and encourages the use of this guideline in conjunction with all legislation and current regulations.

It is also anticipated that patients may inquire about MAiD with paramedics or EMRs. In these circumstances, it is expected that paramedics and EMRs will refer such patients to their primary health care professionals for further information.

Specific situations where paramedics or EMRs may be called to assist in a MAiD event include the following:

1. Inserting an intravenous line that has been ordered by a physician or nurse practitioner for MAiD (paramedics only).

2. Conveying a patient from one destination to another for the purposes of MAiD. Paramedics and EMRs are NOT permitted to administer medication for MAiD under any circumstance.

Paramedics and EMRs are NOT considered health professionals for the purposes of witnessing an eligibility assessment, nor for death confirmation.

BCEHS recognizes that the MAiD program may conflict with an individual paramedic or EMR's belief or value system and will attempt to make suitable arrangements where this occurs. Paramedics and EMRs are expected to take all reasonable steps to ensure that the continuity and quality of care is not compromised.

Resources:

1. BC Ministry of Health: Medical Assistance in Dying☐ [Link]
2. EMALB: Medical Assistance in Dying [Link]
3. Legislative Background: Medical Assistance in Dying (Bill C-14 2016)[Link]

P09: Palliative Care - Medications Prepared for Deferred Subsequent Use

Jennie Helmer

Updated: May 27, 2021
Reviewed: March 01, 2021

Introduction

In November 2020, the Emergency Medical Assistant Licensing Board (EMALB) provided direction and support with regards to the preparation of medications for deferred, subsequent use. Medication administration and assistance are permitted under the EMA Regulations, while dispensing is a controlled act performed by various professions under the authority of other statutes and regulations.

Essentials

Under this guideline, advanced care paramedics (ACPs) are permitted to prepare a palliative care medication for parenteral use and administration by a family member or household caregiver after the paramedic has left the scene.

An ACP with the appropriate license endorsements (Schedule 2, Section 4(b)) is permitted to prepare a palliative care medication for parenteral use and administration by a family member or household caregiver after the paramedic has left the scene under the following conditions:

1. The medication is specified and prepared in accordance to a palliative care management plan developed and authorized by a physician or nurse practitioner; and
2. The medication has already been prescribed to the patient and is in the possession of the patient (i.e., the paramedic is not providing the medication from BCEHS supply); and
3. Authorization from CliniCall has been obtained if the medication is not specified within the Regulation; and
4. The ACP has successfully completed the BCEHS, 'Schedule 2 Endorsement: Palliative Medication,' on the PHSA Learning Hub; and
5. The ACP has received the EMA Regulation Schedule 2, Section 4(b) endorsement for administration of drug therapy on the direct order of a medical practitioner who is designated by BCEHS as a Transport Advisor.

Additional Treatment Information

- Paramedics will complete a full history, obtain a full set of vital signs, and conduct a patient assessment prior to the preparation of palliative medications for administration by a family member or household caregiver.
- Paramedics will complete a full ePCR, documenting the nature of the call, any collaborative care, and ensure that the patient signs the refusal of conveyance or referral of care section (as appropriate).

Referral Information

Clinical Pathway: Palliative Clinical Pathway

Interventions

First Responder

Not authorized

Emergency Medical Responder – All FR interventions, plus:

Not authorized

Primary Care Paramedic – All FR and EMR interventions, plus:

Only authorized to administer medications under existing scope

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

CliniCall consultation required prior to initiation of treatment.

Authorized to prepare palliative medication for administration by a family member or household caregiver following CliniCall consult, under the provisions of a Schedule 2, Section 4(b) endorsement

Community Paramedic (CP) Interventions

Authorized to administer medications under existing scope

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

Authorized as per operational scope

R01: Commencing and Withholding Resuscitation

Clinical Medical Programs
Updated:
Reviewed:

Introduction

This guideline has been designed to provide information to paramedics and EMRs on the holistic aspects of cardiac arrest management – specifically, when to commence and withhold resuscitation.

Beginning CPR

In cases of cardio-pulmonary arrest, start CPR in accordance with the following clinical practice guidelines:

- → N02: Adult cardiac arrest
- → M06: Pediatric cardiac arrest
- → M09: Neonatal resuscitation
- → N04: Traumatic cardiac arrest

Withholding CPR

In some circumstances, it is appropriate to withhold CPR. These circumstances include:

- When the patient exhibits obvious signs of death, such as
  - Putrefaction and decomposition
  - Hypostasis (lividity) or rigor mortis (whole body)
- When the patient has sustained injuries that are incompatible with life, such as
  - Decapitation
  - Cranial and cerebral destruction
  - Hemicorporectomy (transection)
  - Incineration
  - Fetal maceration
- Where performing CPR may endanger the life, health, or safety of paramedics or EMRs/FRs.
- Where a lawful direction to withhold CPR has been provided to paramedics or EMRs. This may include documentation such as an advanced directive, medical order for scope of treatment (MOST), a No CPR form, or the presence of a No CPR MedicAlert bracelet or necklace.

If at any stage paramedics or EMRs are unclear about the criteria for withholding CPR in a specific case, CPR should be started and consultation with CliniCall should be sought to discuss the options.

References

1. Grunau B, et al. Comparing the prognosis of those with initial shockable and non-shockable rhythms with increasing durations of CPR: Informing minimum durations of resuscitation. 2016. [Link]
2. Grunau B, et al. External validation of the universal termination of resuscitation rule for out-of-hospital cardiac arrest in British Columbia. 2017. [Link]
3. Grunau B, et al. Gains of continuing resuscitation in refractory out-of-hospital cardiac arrest: a model-based analysis to identify deaths due to intra-arrest prognostication. 2017. [Link]
4. Morrison LJ, et al. Validation of a rule for termination of resuscitation in out-of-hospital cardiac arrest. 2006. [Link]
5. Reynolds JC, et al. Association between duration of resuscitation and favorable outcome after out-of-hospital cardiac arrest: implications for prolonging or terminating resuscitation. 2016. [Link]

R02: Discontinuing Resuscitation

Clinical and Medical Programs

Updated: May 27, 2021
Reviewed: March 01, 2021

Introduction

This guideline has been designed to provide information to paramedics and EMRs on the holistic aspects of cardiac arrest management: specifically, when to discontinue (or withdraw) resuscitation on medical cardiac arrests. There are two components: the rapid discontinuation and the general discontinuation.

Essentials

For both rapid and general discontinuation criteria, resuscitations led by EMRs or PCPs require a mandatory call to CliniCall as soon as possible after the resuscitation begins. Clinicall paramedics will guide EMRs and PCPs through the discontinuation pathway.

ACP and CCP practitioners can independently follow both rapid and general discontinuation criteria, but must consult with CliniCall for confirmation prior to discontinuing.

Interventions

First Responder

Not applicable for first responders.

Emergency Medical Responder – All FR interventions, plus:

Rapid Discontinuation Criteria

In some instances, CPR may be started when circumstances surrounding the case history are unclear. Rapid discontinuation allows for the cessation of resuscitation in circumstances where resuscitation is ongoing and additional information is obtained.

1. *Prolonged no-flow duration*. All of the following elements must be satisfied prior to discontinuation:
   - The patient was observed to be unresponsive and presumed pulseless for at least 20 minutes prior to the arrival of emergency services, and
   - No CPR was provided during this period, and
   - The patient is not exhibiting any signs of life ('signs of life extinct' - see below), and
   - The patient's cardiac rhythm is asystole, or pulseless electrical activity of less than 30 beats per minute, or an AED does not detect a shockable rhythm.
2. *Terminal illness*. A patient in the final stages of a terminal illness where death is imminent and unavoidable, and where CPR would not be successful, but for whom no formal 'No CPR' decision has been made.
3. *Lawful direction*. When resuscitation is ongoing and a lawful direction to withhold CPR becomes available (including an advanced directive, a medical order for scope of treatment, a 'No CPR' form, or the discovery of a 'No CPR' MedicAlert bracelet or necklace).
4. *Valid direction from a representative*. Paramedics and EMRs who receive a valid direction from a representative who is explicitly named in a representation agreement or an advanced care plan. (Where possible, attach a clear photo of the documentation to the ePCR.)
   - A representation agreement is a document used for substitute decision-making and is different from a power of attorney.

In circumstances where rapid discontinuation is applicable, EMR and PCP staff must consult CliniCall prior to terminating resuscitation efforts and confirmation of ROLE, except for when a lawful or valid direction from a health care representative is present and confirmed.

General Discontinuation Criteria

General criteria apply to most cardiac arrests where the patient is initially considered viable or does not meet the criteria for rapid discontinuation. They involve 20, 30, and 40 minute checks from the time of CPR initiation by either paramedics, EMRs, or FRs, and follow an evidence-based approach to cardiac arrest survival following high-quality resuscitation.

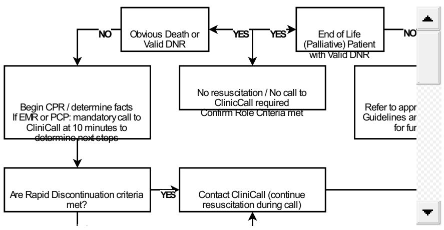
1. 20 minute check: CPR is to be administered by emergency health care providers for no less than 20 continuous minutes, after which CliniCall must be contacted for discontinuation orders where all of the following are present:

1. The arrest was unwitnessed by paramedics or EMRs/FRs, and
2. No shocks were delivered, and
3. There was no return of spontaneous circulation, regardless of duration.

Patients for whom these criteria are true have a 0.12% survival rate.[1,2] If any of these elements are not satisfied, the resuscitation must continue to 30 minutes.

2. 30 and 40 minute checks: The likelihood of meaningful survival for patients still in cardiac arrest at the 30 minute mark is:
   1. Initial non-shockable rhythm: < 1%
   2. Initial shockable rhythm: 11%[3-5]

Termination of resuscitation is appropriate at the 30 minute mark for those patients whose initial rhythm was not shockable. Resuscitation should be extended to 40 minutes for patients whose initial rhythm was shockable, at which point it can be terminated if return of spontaneous circulation has not been achieved.



EMRs are able to apply all elements related to the discontinuation of resuscitation. CliniCall consultation required for decision-supported discontinuation. Call must be made within minutes from time of arrival to determine the next steps.

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

Able to independently apply discontinuation criteria; CliniCall consultation required prior to discontinuation.

R03: Recognition of Life Extinct

Clinical Medical Programs
Updated:
Reviewed:

Introduction

This guideline has been designed to provide information to paramedics and EMRs on the holistic aspects of cardiac arrest management: specifically, how to recognize life extinct, or confirm death. It is to be used in conjunction with R02: Discontinuing Resuscitation.

Essentials:

Consultation with CliniCall must be made to confirm the discontinuation of resuscitation in all cases where CPR was commenced. The recognition of life extinct (ROLE) assessment occurs after the CliniCall consult and termination of resuscitation.

General

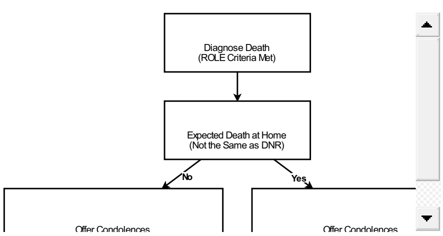
Unless the criteria for obvious death are met, all of the following elements must be satisfied and confirmed independently by at least two paramedics or EMRs following the discontinuation of resuscitation, and before a determination is made that life is extinct:

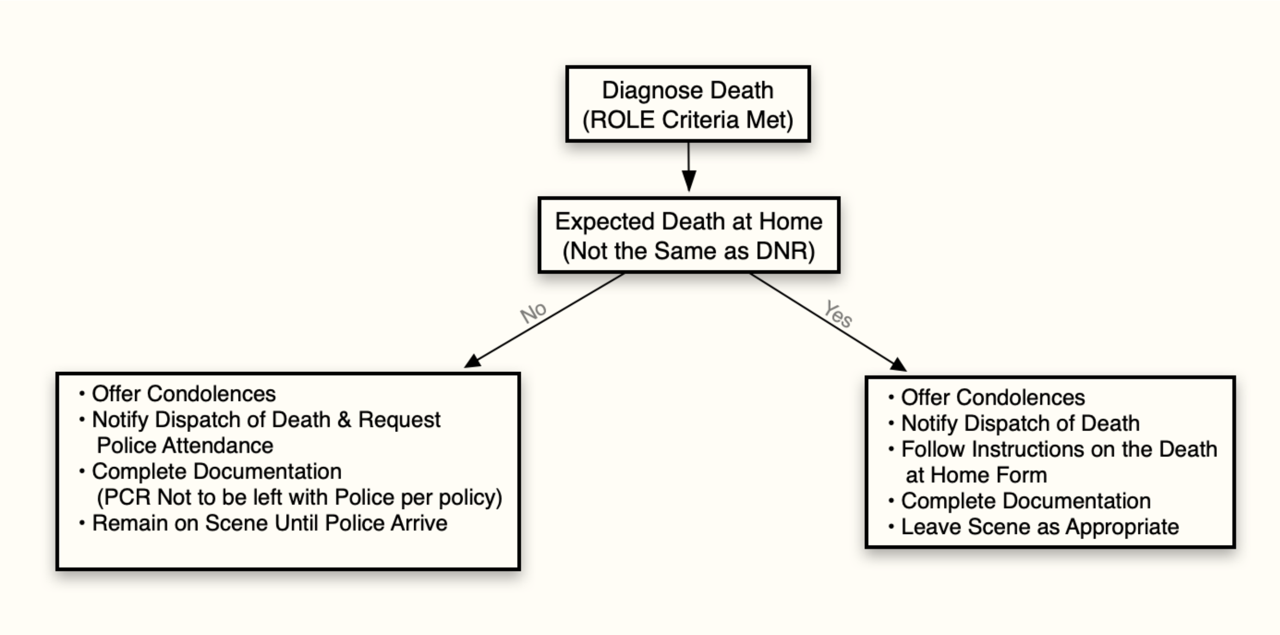
- No palpable carotid pulse for 90 seconds
- No heart sounds heard for 90 seconds
- No breath sounds heard or respiratory effort observed for 90 seconds
- Fixed (non-responsive to light) and dilated pupils. These may vary due to an underlying eye illness.
- No response to central stimuli. (Previous chest compressions is enough to demonstrate a lack of response.)
- ACP and CCP only: when able, observe asystole, or pulseless electrical activity with a rate of 30 beats per minute or less, for over 60 seconds.

In cases of environmentally caused hypothermia, the lack of signs of life is unreliable and cannot be used for recording life extinct. These patients should be conveyed as soon as possible to a facility where aggressive rewarming during resuscitation is possible, preferably using extra-corporeal membrane oxygenation. Contact CliniCall (1-833-829-4099) to discuss options.

In the event paramedics or EMRs are unsure, or are concerned that the ROLE criteria have not been met, CliniCall must be consulted for further guidance.

Actions To Be Taken After Death Has Been Established





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2. Grunau B, et al. Gains of continuing resuscitation in refractory out-of-hospital cardiac arrest: A model-based analysis to identify deaths due to intra-arrest prognostication. 2017. [Link]
3. Grunau B, et al. External validation of the universal termination of resuscitation rule for out-of-hospital cardiac arrest in British Columbia. 2017. [Link]
4. Morrison LJ, et al. Validation of a rule for termination of resuscitation in out-of-hospital cardiac arrest. 2006. [Link]
5. Reynolds JC, et al. Association between duration of resuscitation and favorable outcome after out-of-hospital cardiac arrest: implications for prolonging or terminating resuscitation. 2016. [Link]

R04: Resuscitation Decision-Making

Clinical Medical Programs
Updated:
Reviewed:

Introduction

This guideline has been designed to provide information to paramedics and EMRs on the holistic aspects of cardiac arrest management: specifically, to provide more information regarding resuscitation decision-making and end-of-life care.

Advance Directives, Medical Orders for Scope of Treatment, and No CPR Orders

- What is an advanced directive?
  - An advanced directive is a written instruction made by a capable adult that (a) gives or refuses consent to treatment at the time treatment is required and (b) complies with the requirements of the *Health Care (Consent) and Care Facility (Admission) Act*.
- What makes an advance directive legal?
  - The legal requirements for an advance directive are that it be in writing, be made and signed by the adult at a time when the adult is capable, and be witnessed by two people who may each act as a witness (or one person, if the witness is a lawyer or notary public). Additionally, in the advance directive document, the adult must indicate, in writing, that the adult knows:
    - A health care provider may not provide to the adult any health care for which the adult refuses consent in the advance directive, and
    - A person may not be chosen to make decisions on the adult's behalf for any health care for which the adult has given or refused consent in the advance directive.

Overriding an Advance Directive or Medical Order for Scope of Treatment

A competent patient can *always* make decisions regarding their own care.

- Advance directives allow patients to state their decisions in writing regarding future health care treatments, in the event they are either unable, or not considered competent to communicate them. There are limited situations in which advance directives may be overridden. (For example, there may have been significant changes in medical knowledge, practice, or technology since the directive was written.)
- Medical orders for scope of treatment (MOST) are developed as part of a conversation between a physician (or, in some cases, a nurse practitioner) and the patient, or the patient's substitute decision-maker. A MOST is required to be reviewed regularly by the physician and, unless there has been a substantive change, cannot typically be overridden by a substitute decision-maker.
- An advance directive or MOST should not be overridden without appropriate consultation and direction. In this, or any situation where paramedics or EMRs are uncertain about the appropriateness of a particular clinical intervention, or whether or not to start CPR, CliniCall (1-833-829-4099) should be contacted for support.
- MOST forms are not standardized across health authorities. Paramedics and EMRs should familiarize themselves with local forms here.

Temporary Substitute Decision-Makers

A temporary substitute decision-maker is a capable adult over 19 who has been chosen *by a health care provider* to give or withhold consent on behalf of another adult, when that adult is incapable of making decisions about their own health care.

In the *Health Care (Consent) and Care Facility (Admissions) Act*, a health care provider is defined as a professional licensed, certified, or registered to provide health care in British Columbia under either the *Health Professions Act* or the *Social Workers Act*. Paramedics and EMRs are not currently listed in either act, and therefore are unable to appoint a temporary substitute decision-maker to assist in clinical decision-making. Paramedics and EMRs may, however, use the services of a substitute decision-maker should one be appointed by an eligible health care provider (including a family physician or EPOS physician).

Conflicting Information

In the unlikely event that an advance directive and a MOST or No CPR form offer conflicting information, paramedics and EMRs should recall that Section 11 of the *Emergency Health Services Act* prohibits medical care if an advance directive refuses permission to provide such care.

Additional Resources

For more information please access *BCEHS Policy* *and* *BCEHS Procedure.*

Documentation Requirements

The following information must be recorded in the electronic patient care record:

1. If the decision to discontinue or withhold resuscitation was made by the *paramedic* or *EMR* in accordance with the discontinuation criteria (as established in → R02: Discontinuing Resuscitation), the record must include:
   1. The identity of the paramedic or EMR making the decision, and
   2. The clinical circumstances and findings that enabled the decision to withhold or withdraw interventions in accordance with the requirements listed in → R02: Discontinuing Resuscitation
2. If the decision to discontinue or withhold resuscitation was made by a *health professional*, the record must include:
   1. The identity, unique identifier, and contact details of the practitioner making the decision, and
   2. The clinical circumstances supporting the decision to withhold or withdraw interventions on the basis of good medical practice.
3. If the decision is made on the basis of *the patient's decisions* (either in writing, or in the form of documentation), the record must include:
   1. The type of legal documentation providing consent to withhold or withdraw resuscitation.
   2. The direction, as outlined in the documentation.
   3. A good quality photograph of all pages of the document, taken in such a way that it is materially similar to the original document.
   4. Details of the clinical assessment that would demonstrate that the direction applied in the current circumstances.

No Clinical Procedures are to be Performed Following the Recognition of Life Extinct

Once it is determined that life is extinct, all resuscitation activities must immediately stop. It is unacceptable to continue resuscitation, perform invasive procedures, or implement any form of treatment if the intent is to allow paramedics or EMRs the opportunity to acquire or maintain clinical competencies.

References

1. Grunau B, et al. Comparing the prognosis of those with initial shockable and non-shockable rhythms with increasing durations of CPR: Informing minimum durations of resuscitation. 2016. [Link]
2. Grunau B, et al. Gains of continuing resuscitation in refractory out-of-hospital cardiac arrest: A model-based analysis to identify deaths due to intra-arrest prognostication. 2017. [Link]
3. Grunau B, et al. External validation of the universal termination of resuscitation rule for out-of-hospital cardiac arrest in British Columbia. 2017. [Link]
4. Morrison LJ, et al. Validation of a rule for termination of resuscitation in out-of-hospital cardiac arrest. 2006. [Link]
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Virtual Influenza-Like-Illness (ILI) Assessments

CPG: Virtual Health

Created: May 13, 2020
Updated:

Author: Chris Michel

Introduction:

Virtual care is healthcare at a distance and many assessments need to be adapted in the absence of a face-to-face interaction[1]. General ILI assessments may involve using a stethoscope to listen for lung sounds which is not available in virtual healthcare settings. Information will need to be gathered in other ways, such as listening to the patient's cough, or the audible presence of adverse breath sounds, such as wheezing. As with conventional assessments, determine if the patient is experiencing a particular problem and focus on that area first[2].

Essentials[3]:

1. **Set-up:** Before initiating a virtual visit, make sure you are set up properly, have access to the patient chart, and any additional information that may be required.
2. **Connect:** Determine the most appropriate method for communicating with the patient (either phone or video chat). Confirm that your audio and video connections are working properly.
3. **Get started:** Once you begin the visit, perform a rapid assessment to determine if any immediate interventions are needed. For example, does the patient appear very sick, or are they too short of breath to speak? If so, go directly to asking key clinical questions. If no immediate interventions are required, establish what the patient hopes to gain from the visit (i.e., clinical assessment, referral, reassurance).
4. **History:** Ask questions to determine a history of the present illness.
5. **Examination:** Perform a modified physical exam and ask functional inquiry questions.
6. **Vitals:** The patient may be able to take their own measurements if they have access to vitals equipment at home (i.e., blood pressure monitor, pulse oximeter, scale). Interpret results with caution and use them to support findings in the context of your wider assessment.
7. **Decision and action:** Based on the follow-up assessment, patients may be discharged from care or referred for a 911 emergency response. Patients with worsening conditions, or those exhibiting red-flag symptoms, should be instructed to immediately call 911 for assessment and conveyance to hospital. Patients whose conditions have not worsened, and present without any red-flag symptoms, may be discharged from care and asked to follow-up with their primary care provider.

Assessment Overview:

1. Patients who have entered the ILI Clinical Pathway will have been previously assessed by a paramedic and will have met the following criteria:
    - Between the ages of 17 and 60
    - No 'red flag' symptoms
    - No single NEWS2 score of 3 and have a total NEWS2 score of 3 or less
    - Meets the paramedic's clinical judgement for non-conveyance to hospital
    - Consults with CliniCall
2. Consenting patients will be contacted by a community paramedic within 24-48 hours of the initial assessment. The goal of the ILI follow-up is to assess for worsening patient conditions, or the new presence of any red-flag symptoms.
3. Patients should be assessed using:

- The BCCDC COVID-19 Screening Tool
- Systems based approach
- Presence or absence of red-flag symptoms

Virtual Assessments:

<table>
<tr><th colspan="3">Patients with ILI</th></tr>
<tr><th>Section</th><th>Component</th><th>Question</th></tr>
<tr><td rowspan="9">BCCDC COVID-19 Screen</td><td rowspan="2">Are you experiencing any of the following:</td><td>• Severe difficulty breathing (e.g. struggling to breathe or speaking in single words)
• Severe chest pain
• Having a very hard time waking up
• Feeling confused
• Losing consciousness</td></tr>
<tr><td>If YES to any of the questions, have the patient and/or caregiver immediately call 911 for transport to hospital</td></tr>
<tr><td rowspan="2">Are you experiencing any of the following:</td><td>• Mild to moderate shortness of breath
• Inability to lie down because of difficulty breathing
• Chronic health conditions that you are having difficulty managing because of difficulty breathing</td></tr>
<tr><td>If YES to any of the questions, have the patient and/or caregiver call 911 for transport to hospital</td></tr>
<tr><td rowspan="3">Are you experiencing cold, flu or COVID-19-like symptoms, even mild ones?</td><td>Symptoms include:
• Fever/chills
• Cough
• Shortness of breath
• Sore throat and painful swallowing
• Stuffy or runny nose
• Loss of sense of smell
• Headache
• Muscle aches
• Fatigue or loss of appetite.</td></tr>
<tr><td>If YES, ask:
• Did you develop symptoms within 14 days of travel outside Canada?
• Did you provide care or have close contact with a person with confirmed COVID-19?</td></tr>
<tr><td>Refer patient to get assessed for COVID-19 by calling 811 to find the nearest centre.</td></tr>
</table>

		Instruct the patient to self-isolate for a minimum of 10 days, based on BCCDC recommendations: **"Self-isolate for a minimum of 10 days, so you do not potentially spread the disease to others.** You may return to your regular activities when: • At least 10 days have passed since your symptoms started; AND • Your fever is gone without the use of fever-reducing medications (e.g. Tylenol, Advil), AND • You are feeling better (e.g. improvement in runny nose, sore throat, nausea, vomiting, diarrhea, fatigue).
		Stay home and do not go to work, school or public places and do not use public transit, taxis or ride shares. Do not have visitors to your home. If you live with other people, avoid contact with others at home by staying and sleeping in a separate room and using a separate bathroom if possible. **Cover your coughs and sneezes** • When you feel a cough or sneeze coming on, cover your mouth and nose with a tissue. Don't have a tissue? Cough or sneeze into your upper sleeve or elbow, not your hands. Wash your hands right away after you sneeze, cough or touch used tissues or masks. Throw used tissues into a lined trash can in your room and tie up that trash bag before adding it with other household waste. **Wash your hands** • Wash your hands often with soap and water for at least 20 seconds. It is best to dry your hands with a paper towel and throw it away after use. If you can't wash your hands, use an alcohol-based hand sanitizer. Avoid touching your eyes, nose, and mouth with unwashed hands. Learn more. **Do not share household items** • Do not share dishes, cups, eating utensils, towels, bedding, or other shared belongings. After using these items, wash them with soap and water. **Flush the toilet with the lid down** • COVID-19 virus may also be present in poop (stool or feces). Always wash your hands with soap and water after using the toilet. **General cleaning**

		General cleaning • Water and detergent (e.g., liquid dishwashing soap) or common household cleaning wipes should be used. Apply firm pressure while cleaning. Surfaces should be cleaned at least once a day. Next, use a store bought disinfectant or diluted bleach solution, one part bleach to 50 parts water (20ml of bleach to 1 litre of water), and allow the surface to remain wet for one minute. Clean surfaces that are touched often (e.g., counters, table tops, doorknobs, toilets, sinks, taps, etc.) at least twice a day. **Wear a face mask** • When you are sick, wearing a face mask (surgical or procedure mask) helps to stop the spread of germs from you to others. Wear a face mask when you are in the same room with other people and when you get medical care. If your mask gets wet or dirty, change it and wash your hands right away. You and those you live with do not need to buy and wear other types of masks, such as an N-95 respirator mask. **Note that sometimes people with mild symptoms at the start of their COVID illness may suddenly worsen and require urgent medical care.** • Pay attention to how you are feeling. If it becomes harder to breathe, you can't drink anything or feel much worse, seek urgent medical care at an urgent care clinic or emergency department. **If you are a health care worker** • Follow the advice of your employer. If you need more information, go to this BCCDC site for healthcare workers.
FUNCTIONAL INQUIRY		
		Presence of a headache
		Presence of dizziness
		Episodes of confusion and memory problems
		Episodes of altered mental status or syncope
		Seizure-like activity
		Neck stiffness

FOCUSED ASSESSMENT	**Nervous System**	Altered vision, hearing, taste or smell
		The most common neurologic infections which may produce fever are: 1. ***Meningitis**: Risk factors include age <5 or >65, crowded housing arrangements, immunocompromise, cancer, unvaccinated and HIV/AIDS. Patients may present with headache, confusion, neck stiffness, photophobia seizures or vomiting, although many patients over 65 will present with confusion alone.* 2. ***Encephalitis**: Presents with a very similar clinical picture to Meningitis, although additional risk factors may include recent viral infections, organ transplantation and animal or insect bites*
	Respiratory System	Presence of cough, including colour and quantity of sputum
		Pharyngitis (sore throat)
		Dyspnea (both whilst at rest and on exertion)
		Orthopnea (dyspnea whilst supine)
		Paroxysmal nocturnal dyspnea (shortness of breath during the night)
		Wheezing
		Painful breathing
		Recent chest wall trauma
		Recent respiratory investigations (peak expiratory flow, chest x-ray)
		There are many respiratory infections which may produce fever (including COVID-19, to be discussed separately). Some of the more common include: 1. ***Pneumonia**: Risk factors include age >65, residence in a nursing home, chronic respiratory diseases (COPD, asthma), chronic heart disease, diabetes, alcohol misuse, smoking and poor oral hygiene. Patients commonly present with a cough and mucopurulent sputum, although elderly patients may not present with a cough, dyspnea, pleuritic chest pain, rigors or night sweats, confusion and crackles and decreased*

		rigors or night sweats, confusion and crackles and decreased breath sounds on auscultation or dullness to percussion 2. ***Acute Bronchitis****: Risk factors include recent exposure to viral illness or smoking. Patients may present with a cough up to 30 days, clear or white sputum and no other suspected respiratory disease*
	Cardiovascular System	Recent episodes of tachycardia
		Hypotension
		Chest pain or discomfort (abnormal sensations)
		Palpitations
		Central edema (increased jugular venous pressure)
		Peripheral edema (lower limb edema, abdominal edema)
		Dyspnea (at rest and on exertion)
		Orthopnea
		Paroxysmal nocturnal dyspnea
		There are some cardiovascular infections which may produce fever. The more common include: 1. ***Myocarditis****: Risk factors include HIV/AIDS, autoimmune disease and the postnatal period. Patients generally present with a viral prodrome, including fever, myalgia for 3 weeks preceding the initial presentation.* 2. ***Endocarditis****: Risk factors include a previous history of infectious endocarditis and the presence of artificial heart valves. Patients frequently present with fever, as well as night sweats, malaise, weight loss, weakness and shortness of breath*

		Difficulty swallowing
		Changes in appetite
		Nausea

	The Gastrointestinal System	Frequency, consistency and colour of bowel movements
		Pain on defecation
		Abdominal pain
		Jaundice
		Previous liver or gallbladder issues
		There are multiple gastrointestinal infections which may produce fever. The more common include: 1. ***Viral Gastroenteritis:*** *Risk factors include consumption of contaminated food or water, close contact with other patients, poor hygiene, and chronic comorbidities. Patients will generally present with watery diarrhea, acute onset of vomiting and abdominal cramping without tenderness or rebound tenderness* 2. ***Acute Appendicitis:*** *Will most commonly presented with mid-abdominal pain which later shifts into the right lower quadrant, worsened by movement, significantly decreased appetite and a low-grade fever* 3. ***Acute Cholangitis:*** *Risk factors include patients over 50 with a previous history of cholelithiasis. Patients will typically present with right upper quadrant tenderness, jaundice and fever and may also have pale stool colour*
	The Urinary System	Frequency of urination (including polyuria and nocturia)
		Increased urinary urgency
		Pain or burning on urination
		Flank pain
		Suprapubic pain
		Incontinence (new or chronic)
		Previous urinary infections
		Recent catheter changes

		Recent catheter changes

		There are multiple urinary infections which may produce fever. The most common is: 1. ***Urinary Tract Infection**: Risk factors include sexual activity, history of recurrent UTI and female sex. Patients typically present with dysuria, increased frequency of urination and hematuria. Foul smelling urine is not a diagnostic sign of UTI. Costovertebral angle tenderness may indicate **Pyelonephritis**.*
	The Musculoskeletal System	Recent trauma (swelling, contusions, tenderness)
		Muscular or joint pain
		Unusual swelling, redness or pain to touch
		Chronic back or neck pain
		Limitations of movement
	The Integumentary System	Recent trauma (abrasions, punctures, penetrations, burns)
		Rashes (particularly non-blanching rashes)
		Lumps or sores
		Itching
		Changes in colour of skin
		Changes in hair or nails
	The Immune System	Swelling of glands
		Painful glands
		Excessive weakness or fatigue
		On-going fever
		Fluctuations in blood glucose level

	The Endocrine System	Unusual weight gain or loss
		Heat or cold intolerance
		Excessive diaphoresis
		Excessive thirst or hunger
		Change in shoe size

Risk Identification

Traffic light system for identifying risk in ILI patients			
	• **Green Flag - Low Risk** • **Document visit and report as normal**	• **Yellow Flag - Medium Risk**	• **Red Flag - High Risk** • **Initiate 911 Response**
Skin	• Normal Colour**	• Pale	• Cyanosis** • Non-blanching rash
Respiratory	• Breathing problems have not changed ○ SOB ○ Cough ○ Sputum	• Cough • Rhinorrhea • Congestion	• Severe Dyspnea while at rest • Dyspnea on exertion • Ongoing dyspnea • Hemoptysis
Circulatory	• Normal skin colour** • No new onset chest pain		• Pain or pressure in the chest • Cold, clammy, pale or mottled skin
Neurological	• Normal mentation	• Headache • Dizziness	• New Confusion • Altered mental status • Neck stiffness

5,6,7,8,9,10,11,12,13

** If able to measure using the patient's supplied equipment*

*** If able to assess using video conferencing tools*

Decision and Action

1. All patients with worsening conditions, or those presenting with any red-flag symptoms, should be instructed to call 911 for emergency assessment and conveyance to hospital.
2. Patients without worsening conditions, and absent of red-flag symptoms, can be discharged and asked to follow up with their primary care provider. Prior to discharge:
    - Patients and/or caregivers should be provided with sufficient discharge advice to be able to identify potential deterioration in condition and act accordingly. This should be documented in the care planning section of SIREN.

- Patients should be advised to call 911, 811, or the COVID information line (1-888-COVID19) if their condition worsens, or for additional information.

References & Further Reading:

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Virtual Cardiovascular Assessments

CPG: Virtual Health

Created: April 14, 2020
Updated: --

Author: Chris Michel

Introduction:

Virtual care is healthcare at a distance and many assessments need to be adapted in the absence of a face-to-face interaction[1]. Clinical assessments involve the use of tools and instruments which are not available in virtual healthcare settings. Information will need to be gathered in other ways, such as listening to the patient's cough, or the audible presence of adverse breath sounds, such as wheezing. As with conventional assessments, the clinician must determine if the patient is experiencing a particular problem and focus on that area first. If no particular problem is present, complete a generalized assessment of the relevant system[2].

Assessment Overview:

1. Because the cardiovascular system has several different parts, it makes sense to focus on one section at a time. It may be difficult to assess:
   - Skin colour, temperature, or quality
   - Capillary refill time
   - Peripheral pulses
   - Heart sounds
   - Peripheral edema
   - Blood pressure
2. When conducting a virtual assessment of this system, use careful questioning to gather important information. Keep in mind that the cardiovascular and respiratory systems are closely related, and some of the assessment questions may be appropriate for either body system. As with all major body system assessments, determine first if the patient is experiencing any particular cardiovascular problem. If so, focus on that area first. If not, complete a general assessment of this system[2].

Virtual Assessments:

Cardiovascular System(2)		
Section	**Component**	**Question**
MODIFIED EXAM	**Cognitive Function**	Is the patient alert?
		Does the patient appear confused?
	Work of Breathing	Does the patient appear to have an increased work of breathing?
		Can the patient complete a sentence without having to stop and take a breath?
		Ask the patient to walk to another part of the room. Listen to their ability to breath and talk while walking.
		After walking, ask the patient if he or she feels short of breath. You will be able to hear or determine this by the patient's ability to talk,

		walk, or breathe
		Does the patient feel the need to sit down after walking a short distance?
	Lung Sounds	Ask the patient to take a deep breath in through the nose and exhale through the mouth. ● Are there any audible lung sounds? ○ Wheezes? ○ Rhonchi? ● Does the action of taking a deep breath in and out cause the patient to cough
		Listen to the patient talk and assess if a cough is present. ● If coughing, note if it sounds dry or moist.
	Skin	Assess the patient skin colour
		Assess for peripheral edema
		Assess for bruising or redness on extremities
		Assess for jugular vein distention
FUNCTIONAL INQUIRY	**Heart**	How would you rate your energy level? ● Good, fair or poor?
		Have you ever been told that you have a heart problem? ● If so, what problem(s)?
		Have you ever had an electrocardiogram (EKG)?
		Have you ever been told that you have an irregular heart rhythm? ● Do you ever feel like your heart skips a beat or "changes gears"? ● Do you ever feel like your heart is beating fast? ● Do you ever feel like there is a bird fluttering in your chest?
		Have you ever passed out (lost consciousness) without any known reason?
		Have you ever had an infection that affected your heart?
		Have you ever had surgery on your heart as an adult or as a child?
		Have you ever experienced chest pain?

		● If so, describe the pain.
		Describe the color of the skin under your fingernails. ● Would you say that it is: ○ Pink ○ Red ○ White ○ Pale
	Arterial Circulation	Have you ever been told that you have a problem with any of your arteries? ● If so, which ones?
		When was the last time that you had your blood pressure measured? ● If so, do you remember what the numbers were?
		Do you ever wake up with a headache?
		Do you ever experience blurred vision?
		Do you ever have nosebleeds? ● If so, when was the last nosebleed? ○ How long did it last? ○ What did you do to make it stop?
		Have you been prescribed or are taking medication for high blood pressure? ● If so: ○ What is the name of your medication? ○ How often do you take it? ○ How long have you been taking it? ○ Have you had any problems or side effects from taking this medication?
		Is the color of your lower legs the same color as the rest of your skin?
		Do you have any swelling around your feet or ankles?
		Do you have any numbness or tingling of your feet or hands?
		Do you ever have pain in your calves (the back of your lower legs) when you walk? ● If so:
		○ How would you describe the pain? ■ (The pain of arterial insufficiency is often described as sharp or stabbing.)

		○ Does exercise or walking make it better or worse? ■ (Walking will make arterial insufficiency worse.) ○ How long does it last? ○ What do you do to make it stop? ○ Does elevating your legs make the pain better or worse?
		Have you noticed if the amount of hair on your lower legs has changed?
		Does the skin of your lower legs appear shiny?
		Do you smoke cigarettes or use any tobacco products? ● If so, for how long? (pack years) ● How much do you smoke or use tobacco products?
	Venous Circulation	Is the skin over the front of your lower legs darker in color than the rest of the skin on your legs?
		Do you have any wounds or sores on your legs or ankles? ● If so: ○ How long have you had these sores? ○ What have you been using to treat the sores?
		Do you ever experience swelling of your legs and ankles? ● If so, does elevating your legs make the swelling go down?
		Do your legs swell if you sit or stand in one position too long?
		How would you rate your activity level? ● Active ○ (participate in sports or other activity daily) ● Moderate ○ (participate in sports or other activity a few times a week) ● Sedentary ○ (limited to household chores)
		Do you ever experience pain in your lower legs? ● If so: ○ Describe the pain. ■ (The pain of venous insufficiency is often described as a feeling of fullness or aching.) ○ Does walking make the pain better or worse? ○ How long does the pain last? ○ What do you do to make the pain stop or improve?
		Have you ever been diagnosed with varicose veins? ● If so:

		○ What treatment have you received, if any? ○ What do you do to reduce the discomfort from the varicose veins?

	Lymphatic System	Do you have any swelling? ● On your neck? ● Around your upper chest/armpits? ● One arm or hand? ● Groin? ● One leg?
		Have you ever been told or diagnosed with a problem with your lymph system or drainage?
		Have you had any surgeries that interrupt lymph drainage such as surgery for breast cancer?
		Do you ever get "swollen glands" with an infection or chest cold?
		Have you ever had to be hospitalized for the infection and the swollen glands?
		Have you ever been diagnosed or treated for cancer that affects the lymph or glands?
	Blood	Have you ever been told or diagnosed with a problem with your blood? ● If so, please describe the problem.
		Have you ever been diagnosed with anemia caused by low iron?
		Have you ever been diagnosed with anemia caused by something else?
		Do you take or have been prescribed medication to treat anemia? ● If so: ○ What is the name of the medication? ○ How long have you been taking it? ○ How many times a day do you take it? ○ Is it a pill or do you have to get injections?
		Do you ever get short of breath when you do routine activities? ● (This question might be inappropriate if the patient smokes. If the patient does not smoke, shortness of breath can be an indication of a low hemoglobin level.)
		Do you take or have been prescribed any medication that makes your blood thinner? ● If so: ○ What is the name of the medication?

		○ How long have you been taking the medication? ○ How many times a day do you take it?
		Do you ever get any bruises on your skin that just occur without any injury? ● Where are these bruises located? ● How long do they last? ● Do they routinely reappear?
		Do your gums bleed easily when brushing your teeth? ● How long has this been going on? ● Have you discussed this with your doctor, dentist, health care provider?
		When you get a minor cut or scrape of the skin, how long does it take for the area to stop bleeding? ● Do you have to apply pressure to the area to make it stop bleeding?
		Have you ever been told or diagnosed with a health problem that affects your blood's ability to clot such as hemophilia? ● Do you know the type of hemophilia? ● Have you had to be hospitalized for treatment of hemophilia? ● Do you take medication for hemophilia?
		Do you recall the last time that you had an infection? ● What type of infection was it? ● Were you prescribed antibiotics for the infection? ● Has the infection reappeared since the last treatment?
		How often do you experience a fever? ● If frequently: ○ Is there a particular time of day when the fever occurs? ○ What do you do to treat the fever? ○ Do you experience extreme sweating when the fever breaks?
		Do you take or have been prescribed a medication called a steroid? ● If so: ○ Why were you prescribed this medication? ○ Are you still taking this medication? ○ Can you recall the last time you had to take this medication? ○ How long did you take it?
	Chest Pain	Assess the pain for: ● Quality

FOCUSED ASSESSMENT		• Location • Radiation to the arm or jaw area • Associated with nausea/vomiting • Sweating
		Assess how long it has been going on
		Suspect an acute myocardial infarction if this is a new episode and initiate a 911 response
		Suspect angina if this has happened before • *Assess if patient has medication to treat the chest pain* • *Suggest the patient follow the directions to treat the chest pain*
	Dysrhythmia	Assess if the patient has a history of an irregular heartbeat
		Assess if the patient ever feels like the heart is skipping beats
		Assess if the patient has prescribed medication to treat the irregular

		heartbeat

		Assess if the patient is experiencing palpitations or fluttering.
		• If so, determine:
		  ○ Frequency
		  ○ Time the discomfort has been occurring

		Assess associated factors such as: • Occurring after ingesting something containing caffeine (coffee) or chocolate • Occurring during or after smoking
	Heart Failure	Assess if the patient has a history of foot/ankle/lower leg swelling

		Assess if the patient has a cough. Determine if the cough “sounds” productive.
		• If so, ask:
		  ○ How long has the cough been occurring?
		  ○ Is there any phlegm produced?
		  ○ The color of the phlegm?

		Assess if the patient has noticed the veins in the neck being more prominent than usual
		Assess if the patient has ever been diagnosed with heart failure
		Assess if the patient takes or is prescribed medications for heart

		Assess if the patient takes or is prescribed medications for heart failure. ● If so, ○ What is the name of the medication? ○ How long has the medication been prescribed? ○ How many times a day is the medication taken?
		Assess if the patient is experiencing any new symptoms of heart failure
	Problems with Circulation	Assess if there is a change in the color of the skin over the lower extremities
		Assess if the feet and legs feel cold or warm to touch
		Assess if the feet/legs feel numb
		Assess if the skin appears shiny or if there is a change in the amount of body hair over the lower extremities
		Assess if there is any swelling of the feet/ankles/lower legs
		Assess if there are any wounds on the legs
		Assess if the patient is experiencing any pain with activity and inactivity
		Suspect arterial insufficiency if the skin is red in color and experiences pain with walking or other activity.
		Suspect venous insufficiency if the skin is dark brown and experiencing a feeling of heaviness or fullness of the legs when sitting or standing in the same position
	Swollen Glands	Assess the location of the swollen gland ● Neck ● Under the arm ● Groin
		Assess how long the gland has been swollen
		Assess if the swollen gland is painful to touch
		Assess if the swollen gland can move, or is fixed, or feels like it is sticking to one area
		Assess if the swollen gland feels like rubber, or harder like a marble ● Suspect an acute infection if the swollen gland is movable and rubbery

		• Suspect another disease process if the swollen gland is hard and immovable
	New Onset of Morning Headache	Assess where the headache is located? • Around the back of the neck • Throughout the forehead
		Assess if the headache gets better as the day progresses?
		Assess what has been done for the headache: • Taking over-the-counter medication • Laying down with a cool compress
	Blurred Vision	Assess when the blurred vision first started
		Assess if the patient participates in any activities that could cause eyestrain • Needlepoint • Reading small print • Extensive computer work, etc.
		Assess if there are any other eye changes noticed • Tearing • Crusting • Redness • Drainage
	Nosebleed	Assess what the patient was doing when the nosebleed started
		Assess how long the bleed lasted
		Assess what was done, if anything, to help stop the bleeding
		Suspect an elevation in blood pressure
	New onset	Assess how long the fatigue has been occurring

	Fatigue	Assess when the fatigue was first noticed
		Assess what is being done about the fatigue
		Assess if the fatigue is associated with any other symptoms, such as: • New onset of productive cough • New onset of foot/ankle/lower extremity swelling • Change in amount of urine output • Change in appetite • Blurred vision

		• Blurred vision • Headache • Irritability • Shortness of breath or difficulty "catching the breath" • New onset of numbness or tingling of the feet/hands • Inability to complete activities of daily living without having to stop and rest
		Suspect exacerbation or new onset of heart failure if fatigue is associated with: • *Productive cough* • *Lower extremity edema* • *Change in urine output* • *Change in appetite* • *Shortness of breath* • *Irritability*
		Suspect acute elevation of blood pressure if fatigue is associated with: • *Blurred vision* • *Headache*
		Suspect anemia for the fatigue is associated with: • *Shortness of breath* • *Activity intolerance* • *Numbness/tingling of the hands/fee*t
	Unexplained Bruising	Assess where the bruises are located
		Assess for the estimated size of the bruises

		Assess if the bruises are:
		• clustered around a joint such as
		  ○ Knee
		  ○ Ankle
		• Scattered over a large area such as
		  ○ Over both arms
		  ○ Both legs
		  ○ Abdomen
		  ○ Lower back

		Assess if the patient recalls bumping into anything that could have caused the bruising
		Assess if the bruises are painful
		Assess if experiencing any new onset of bleeding gums, nosebleed,

		or coughing of blood
		Suspect an alteration in platelets/clotting with a new unexplained onset of bruising
	Experiencing Fevers	Assess when the fevers were first noticed
		Assess if the fevers occur during any particular time of day
		Assess if the fevers are associated with any other symptoms or body changes
		Assess what the patient has been doing to treat the fevers
		Assess if the fevers are occurring more or less frequently
	New Onset of Peripheral Edema	Assess the area that is edematous
		Assess if the patient can see an indentation when the swollen area is pressed with a finger
		Assess when patient measured body weight ● Assess if the weight has increased since the last measurement
		Assess if there has been a change in amount of urine voided
		Assess if the patient has increased the amount of salt ingested
		Assess if the patient has noticed tightness or swelling of the: ● Fingers/hands ● Under/around the eyes
		Suspect acute fluid volume overload (which can be due to heart failure, renal failure, hypertension)

Risk Identification

Traffic light system for identifying risk in cardiovascular patients			
	• **Green Flag - Low Risk** • **Document visit and report as normal**	• **Yellow Flag - Medium Risk** • **Report to Primary Care Provider**	• **Red Flag - High Risk** • **Arrange Transport to Hospital**
Colour (of skin, lips, fingers)	• Normal Colour**	• Localized area of painful blisters or rash	• Diaphoresis • Cyanosis • Ashen
Activity	• Appetite is normal • Ability to exercise • Normal ADL's • No trouble sleeping	• Feel more tired • Lacking the energy to do daily activities. • Finding it easier to sleep by adding pillows or sitting up in a chair.	• Syncope • Altered level of consciousness
Respiratory	• Breathing problems have not changed ○ SOB ○ Cough ○ Sputum	• More short of breath than usual. • Dry hacking cough. • Difficulty breathing while lying down • Pain occurs with deep breathing	• Struggling to breathe • Shortness of breath does not go away while sitting still.
Circulatory	• No chest discomfort, pain or pressure. • No swelling or increase in swelling to your feet, ankles, legs, or stomach, • No weight gain more that 4lbs (2kg) over 2 days in a row, or 5lbs (2.5kg) in 1 week.	• Weight gain more than 4 lbs (2 kg) over 2 days in a row or 5 lbs (2.5 kg) in 1 week. • Increased swelling in the feet, ankles, legs, or stomach. • Change in chest pain pattern in known cardiac patients • Chest pain with exertion that is relieved with rest • Pain occurs when pressure is applied to the area • Intermittent mild chest discomfort with deep productive coughing	• Tachycardia that does not resolve with rest • Chest pain that is not resolved with rest or medications. • New onset continuous or intermittent chest pain, tightness or pressure • Heart palpitations • Chest pain at rest • Repeated shocks and internal defibrillator in place
Other		• Vomiting and/or diarrhea that lasts more than two days. • New onset light-headedness or dizziness • Feeling uneasy, like something does not feel right.	• New onset confusion

4, 5, 6, 7, 8, 9

* If able to measure using the patient's supplied equipment
** If able to assess using video conferencing tools

Decision and Action

1. All patients with worsening cardiovascular symptoms (yellow) should be referred to their primary care provider for assessment.
2. If the paramedic does not have an existing history with the patient, they should strongly consider emergency transport to hospital for any patients experiencing yellow flag symptoms.
3. Patients with red flag symptoms should be transported to the emergency department for assessment and treatment
4. Medication administration prior to arrival (ASA, NTG)

Additional Treatment Information:

1. Many patients living with heart failure utilize a Heart Failure Zone plan, which is provided by their primary care provider. Patients should be encouraged to follow their action plan when and if they become symptomatic[9].

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Virtual Respiratory Assessments

CPG: Virtual Health

Created: April 7, 2020
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Author: Chris Michel

Introduction:

Virtual care is healthcare at a distance and many assessments need to be adapted in the absence of a face-to-face interaction[1]. General respiratory assessments involve using a stethoscope to listen for lung sounds, which is not available in virtual healthcare settings. Information will need to be gathered in other ways, such as listening to the patient's cough, or the audible presence of adverse breath sounds, such as wheezing. As with conventional assessments, determine if the patient is experiencing a particular problem and focus on that area first. If no particular problem is present, complete a generalized assessment of the respiratory system[2].

Essentials[3]:

1. **Set-up:** Before initiating a virtual visit, make sure you are set up properly, have access to the patient chart, and any additional information that may be required.
2. **Connect:** Determine the most appropriate method for communicating with the patient (either phone or video chat). Confirm that your audio and video connections are working properly.
3. **Get started:** Once you begin the visit, perform a rapid assessment to determine if any immediate interventions are needed. For example, does the patient appear very sick or are they too short of breath to speak? If so, go directly to asking key clinical questions. If no immediate interventions are required, establish what the patient hopes to gain from the visit (i.e., clinical assessment, referral, reassurance).
4. **History:** Ask questions to determine a history of the present illness.
5. **Examination:** Perform a modified physical exam and ask functional inquiry questions.
6. **Vitals:** The patient may be able to take their own measurements if they have access to vitals equipment at home (i.e., blood pressure monitor, pulse oximeter, scale). Interpret results with caution and use them to support findings in the context of your wider assessment.
7. **Decision and action:** Based on your findings, decide if you should report to the patient's most responsible provider, or if the patient requires immediate conveyance to hospital.

Assessment Overview:

1. Because the respiratory system includes two sets of structures, the assessment should be divided into two parts. This assessment can be challenging as it may be difficult to visualize:
   - Nasal flaring
   - Nasal drainage, colour, and consistency
   - Edematous sinus areas
   - Chest drainage, colour, and consistency
   - Chest diameter
   - Nail bed clubbing
2. Paramedics traditionally use a stethoscope to listen for lung sounds, but this may not be available when providing virtual care. What will be audible is the presence of a cough and the “noisiness” of breath sounds. The microphone will serve as the “virtual” stethoscope. As with all major body system assessments, determine first if the patient is experiencing any particular respiratory problem. If so, focus on that area first. If not, complete a general assessment of this system[2].

Virtual Assessments:

Upper Respiratory		
Section	**Component**	**Question**
		Does the patient’s voice sound clear?

MODIFIED EXAM	**Voice Quality**	
		Does the patient sound "congested" or does the voice have a "nasal" quality?
		Is the patient "clearing the throat" while talking?
FUNCTIONAL INQUIRY	**General**	Have you noticed or experienced any changes in your breathing? ● If so, please describe the changes.
		How many pillows do you need or use to sleep and breathe comfortably? ● Has there been a change in the number of pillows you use?
		Have you ever been diagnosed with a respiratory problem? ● If so, what is the problem?
	Nose	Do you breathe through your nose?
		Have you experienced any nasal stuffiness or congestion? ● Do you have associated symptoms, such as fever, cough, headache, or sinus pressure?
		Are you experiencing any nasal drainage? ● If so, what is the color of the drainage?
		Is there any particular pattern to your sneezing?
	Mouth	Do you breathe through your mouth? ● If so, what is the primary reason for mouth-breathing?
	Pharynx, larynx	Have you noticed any changes in your ability to swallow?
		Have you noticed any changes in your voice quality? ● If so, describe the changes.
FOCUSED ASSESSMENT	**Nose**	Have you ever had a nosebleed? ● What did you do to control the bleeding?
	Throat	How long has your voice sounded hoarse or raspy? ● Has this ever happened to you before? ● What did you do to make the sound of your voice better?
		Are you experiencing any other symptoms like upper chest pain or swelling of the neck, face, or arms? ● Do you have swelling to your neck, face, or arms?

Lower Respiratory

Section	Component	Question
MODIFIED EXAM	**Work of Breathing**	Can the patient complete a sentence without having to stop and take a breath?
		Ask the patient to walk to another part of the room. Listen to their ability to breath and talk while walking.
		After walking, ask the patient if he or she feels short of breath. You will be able to hear or determine this by the patient's ability to talk, walk, or breathe.
		Does the patient feel the need to sit down after walking a short distance?

	Lung Sounds	Ask the patient to take a deep breath in through the nose and exhale through the mouth.
		● Are there any audible lung sounds?
		  ○ Wheezes?
		  ○ Rhonchi?
		● Does the action of taking a deep breath in and out cause the patient to cough

FUNCTIONAL INQUIRY	**Bronchi, Lungs**	Have you been experiencing a cough?
		● If so, how long have you had the cough?
		  ○ What causes the cough to occur?
		  ○ What makes the cough better?
		  ○ Are you coughing up any phlegm?
		    ■ If so, how often
		    ■ Describe the color of the phlegm.
		  ○ What does the cough sound like?
		    ■ Dry?
		    ■ Hacking/barking?
		    ■ Moist/gurgling?
		  ○ Does the cough cause you any pain?
		    ■ If so, describe the pain
		  ○ Do you ever wake up from sleep coughing?
		    ■ If so, what do you do to stop coughing?

FOCUSED ASSESSMENT	**Shortness of Breath**	Do you feel like you can't catch your breath? ● Has this ever happened before? ● Do you feel short of breath when you are moving? ● Do you feel short of breath at rest? ● What did you do to help it in the past?

	Cough	What color is your phlegm?
		● Have you coughed up this color of phlegm before?
		● Is there blood in your phlegm?
		  ○ How long has this been going on?
		  ○ Are you having any chest pain?

		○ Describe the color: ■ Dark red ■ Light pink ■ Streaks of blood ○ What medications are you taking? (assess for anticoagulants, aspirin)

General Concerns		
Section	**Component**	**Question**
MODIFIED EXAM		
FUNCTIONAL INQUIRY	**Environment**	Do you have, or have you been diagnosed with allergies? ● What are you allergic to? ● Have you been prescribed medication to treat the allergies? ● How frequently do you experience respiratory effects from the allergies?
		Are you exposed to items in your work or home environment that affect your breathing or cause you to cough?
		Do you smoke? ● How much do you smoke? (Packs per day) ● When did you start smoking? (Pack years) ● Have you attempted smoking cessation? ○ If so, when was the last time you stopped smoking?
		Do you use any other inhalants such as marijuana, vaping, glue, or spray paint? ● If so, how frequently do you use these inhalants?
	Preventative Measures	Do you receive an annual influenza vaccination?
		Have you ever received a vaccination for pneumonia?
	Physical	Have you noticed if your shirts or blouses are more snug across your chest?
		Have you noticed any changes in your fingernails? ● Are the tips of your fingers becoming thicker? ● Are the nails growing over the tips of the fingers? ● What is the color of your nail beds? ○ Pink, pale, whitepale, blue?
FOCUSED ASSESSMENT		

Risk Identification:

Traffic light system for identifying risk in COPD patients			
	• **Green Flag - Low Risk** • **Document visit and report as normal**	• **Yellow Flag - Medium Risk** • **Report to Primary Care Provider**	• **Red Flag - High Risk** • **Arrange Transport to Hospital**
Colour (of skin, lips, fingers)	• Normal Colour**	• Pallor**	• Pale** • Mottled** • Ashen** • Cyanosis**
Activity	• Appetite is normal • Ability to exercise • Normal ADL's • No trouble sleeping	• Feeling run down or tired • Breathlessness walking 100m on level ground • Increasing limitation of ADL's • Past history of exacerbations requiring corticosteroids and/or antibiotics.	• Confusion • Agitation • Drowsy • Decreased LOC

Respiratory	• Breathing problems have not changed
	  ◦ SOB
	  ◦ Cough
	  ◦ Sputum
		• More SOB than usual
		• Coughing more than usual
		• Wheezing more than usual
		• Increased sputum production
		• Green, yellow, or rust coloured sputum
			• Extreme or abnormal shortness of breath
			• RR >30**
			• O2<88%*
			• Haemoptysis
			• Copious sputum production
			• Ineffective respirations**
			• Silent chest

Circulatory	• Normal skin colour**		• Sudden onset abnormal chest pain or pressure • Peripheral edema • Ascites • Hypotension* • Heart palpitations • Unstable arrhythmia • Bradycardia <40bpm* • Tachycardia >100bmp*
Other		• New cold or flu • Weather changes • Exposure to air pollution	• Marked weight loss • Night sweats • Persistent morning headaches • Light-headedness • Dizziness • Fainting

5,6,7,8,9,10,11,12,13

* If able to measure using the patient's supplied equipment

** If able to assess using video conferencing tools

Decision and Action:

1. All patients with worsening respiratory symptoms (yellow) should be referred to their primary care provider for assessment.
2. If the paramedic does not have an existing history with the patient, they should strongly consider emergency conveyance to hospital for any patients experiencing yellow flag symptoms.
3. Patients with red flag symptoms should be conveyed to the emergency department for assessment and treatment. Severe respiratory symptoms include:
   - Severe shortness of breath at rest

- Painful respirations
- Chest pain or pressure
- Cold/clammy skin
- New onset of confusion
- Decreased level of consciousness
- Central cyanosis

Additional Treatment Information:

1. Many patients living with COPD utilize a COPD flare-up action plan[4] which is provided by their primary care provider. Patients should be encouraged to follow their action plan when and if they become symptomatic.

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Virtual Diabetic Assessments

CPG: Virtual Health

Created: April 15, 2020
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Author: Chris Michel

Introduction:

Virtual care is healthcare at a distance and many assessments need to be adapted in the absence of a face-to-face interaction[1]. Clinical assessments involve the use of tools and instruments which are not available in virtual healthcare settings. Information will need to be gathered in other ways, such as listening to the patient's cough, or the audible presence of adverse breath sounds, such as wheezing. As with conventional assessments, determine if the patient is experiencing a particular problem and focus on that area first. If no particular problem is present, complete a generalized assessment of the relevant system[2].

Essentials[3]:

1. **Set-up:** Before initiating a virtual visit, make sure you are set up properly, have access to the patient chart, and any additional information that may be required.
2. **Connect:** Determine the most appropriate method for communicating with the patient (either phone or video chat). Confirm that your audio and video connections are working properly.
3. **Get started:** Once you begin the visit, perform a rapid assessment to determine if any immediate interventions are needed. For example, does the patient appear very sick or are they too short of breath to speak? If so, go directly to asking key clinical questions. If no immediate interventions are required, establish what the patient hopes to gain from the visit (i.e., clinical assessment, referral, reassurance).
4. **History:** Ask questions to determine a history of the present illness.
5. **Examination:** Perform a modified physical exam and ask functional inquiry questions.
6. **Vitals:** The patient may be able to take their own measurements if they have access to vitals equipment at home (i.e., blood pressure monitor, pulse oximeter, scale). Interpret results with caution and use them to support findings in the context of your wider assessment.
7. **Decision and action:** Based on your findings, decide if you should report to the patient's most responsible provider, or if the patient requires immediate conveyance to hospital.

Assessment Overview:

1. It has been found that, for people with diabetes, virtual healthcare reduces the onset of macro and micro complications and subsequent hospitalizations. The purpose of contacting people is to reinforce their prescribed treatment plan. In general, the major categories when providing care are:
   - Self-monitoring
   - Medications
   - Nutritional intake
   - Activity/exercise
   - Diagnostic evaluation
   - Preventive actions[2]

Virtual Assessments:

Diabetic Assessment(4)

Section	Component	Question
MODIFIED EXAM	**Neurological**	Does the patient appear to have an altered level of consciousness?
		Does the patient appear confused?
		Does the patient appear drowsy or fatigued?
		Does the patient appear irritable?
	Respiratory	Does the patient appear to have an increased respiratory rate?
	Skin	Does the patient appear to have pale and/or clammy skin?
FUNCTIONAL INQUIRY	**General**	Do you feel more irritable than normal?
		Have you recently checked your blood glucose levels? ● What was the reading?
		Do you feel like you have fever or chills? ● What is your temperature?
	Activity	Do you feel excessive fatigue?
		Do you feel drowsy?
		Do you feel confused?
	Head	Do you feel more dizzy than normal?
		Do you have a new onset headache?
		Have you experienced any changes to your vision? If so ● Are you experiencing blurred vision? ● Are you experiencing double vision? ● Are you experiencing reduced vision?
	Mouth	Does your mouth feel more dry than normal?
	Respiratory	Do you feel more short of breath than normal?
		Do you have a new cough? ● Are you coughing up any phlegm?

		• What colour is the phlegm?
	GI/GU	Have you been experiencing nausea or vomiting that is more than normal for you? If so • Have you been vomiting for more than 12 hours? • Have you been able to ingest your prescribed medications?
		Have you been experiencing diarrhea that is more than normal for you?
		Have you had an increase in the frequency that you urinate?
		Have you noticed any changes to the smell of your urine?
		Are you experiencing pain while urinating?
		Does your urine appear dark or cloudy?
		Do you have blood in your urine?
		Are you experiencing lower back pain?
	Skin	Describe your skin colour. Is it more pale than normal?
		Does your skin feel moist or sweaty?
		Do you have any new wounds on your skin?
		Do you have any open wounds that do not appear to be healing?
		Do you have any wounds that appear infected (red/swollen/foul smell)?
		Have you inspected your feet recently for new wounds?
FOCUSED ASSESSMENT		

Risk Identification:

Traffic light system for identifying risk in diabetic patients			
	• **Green Flag - Low Risk** • **Document visit and report as normal**	• **Yellow Flag - Medium Risk** • **Report to Primary Care Provider**	• **Red Flag - High Risk** • **Arrange Transport to Hospital**
Colour (of skin, lips, fingers)	• Normal colour**	•	• Pale • Clammy • Diaphoresis
Neurological	• Normal activity levels • Ability to perform normal ADL's	• Light-headed • Drowsy • Numbness and tingling to tongue or lips • Confused • Headache • Weakness • Blurred vision	• Altered level of consciousness • Double vision • Disorientation • Syncope • Seizure like activity
Respiratory	• No increased work of breathing	• New onset cough with discoloured sputum	• Deep, rapid respirations • Respiratory distress
Circulatory	• Blood pressure less than 130/80 mmHg	• Tachycardia • Open sores and wounds that are not healing properly	• Sudden onset chest pain/pressure or discomfort.
Other	• Fasting and/or before meal blood sugar between 4-7 mmol/L or within the target range recommended by the primary care provider. • A1C is 7% or less OR within the target provided by the primary care provider.	• Blood sugar is less than 4 mmol/L • Blood sugar is above target range • Nauseated • Anxiety • Irritable • Hunger • Increased thirst • Urinating more than normal • Weight loss • Inadequate response of symptoms to outpatient management • Inability to eat or sleep due to symptoms • Inability to care for oneself	• Blood sugar less than 4 mmol/L after attempting to treat at home • Blood sugar greater than 20 mmol/L for more than 8 hours, combined with other symptoms (Type 2 diabetics) • Blood sugar greater than 14 mmol/L before meals, or at bedtime on two tests in a row, combined with other symptoms (Type 1 diabetics)

4,5,6,7,8

* If able to measure using the patient's supplied equipment
** If able to assess using video conferencing tools

Decision and Action:

1. All patients with worsening diabetic symptoms (yellow) should be referred to their primary care provider for assessment.
2. If the paramedic does not have an existing history with the patient, they should strongly consider emergency conveyance to hospital for any patients experiencing yellow flag symptoms.
3. Patients with red flag symptoms should be conveyed to the emergency department for assessment and treatment.

Additional Treatment Information:

1. Many patients living with diabetes utilize a 'Diabetes Zones' plan, which is provided by their primary care provider. Patients should be encouraged to follow their action plan when and if they become symptomatic.

References & Further Reading:

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Virtual Palliative Assessments

CPG: Virtual Health

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Author: Chris Michel

Introduction:

Virtual care is healthcare at a distance and many assessments need to be adapted in the absence of a face-to-face interaction[1]. Clinical assessments involve the use of tools and instruments which are not available in virtual healthcare settings. Information will need to be gathered in other ways, such as listening to the patient's cough, or the audible presence of adverse breath sounds, such as wheezing. As with conventional assessments, determine if the patient is experiencing a particular problem and focus on that area first. If no particular problem is present, complete a generalized assessment of the relevant system[2].

Paramedics providing palliative care ought to practice "relationship-based care" by adopting a humble, self-reflective clinical practice and positioning themselves as a respectful and curious partner when providing care. In particular, paramedics should seek to respect and learn about Indigenous (First Nations, Métis, and Inuit) and different cultural approaches to palliative care while reflecting on their own values and beliefs. Acknowledging what the differences and the effects of a paramedics' values and beliefs can have on others is an important step towards cultural humility.

Consult with patients' usual care team for the creation of a collaborative symptom management plan. If the usual care team is not available or the patient is not under a care team, consider contacting CliniCall (1-833-829-4099 or 604-829-4099) for the creation of a collaborative symptom treatment plan. Where the patient has not followed their symptom management plan, paramedics may encourage the patient/caregiver to administer any medications recommended as part of that plan[3,4].

The person is recognized as a palliative patient or at end-of-life by one or more of the following:

- Person is diagnosed with a life limiting illness
- Care is currently focused on comfort and symptom management rather than curative interventions
- Person presents with Goals of Care Designation consistent with treatment in place
- Person is under care of a physician and/or home care providing palliative care services

Essentials[5]:

1. **Set-up:** Before initiating a virtual visit, make sure you are set up properly, have access to the patient chart, and any additional information that may be required.
2. **Connect:** Determine the most appropriate method for communicating with the patient (either phone or video chat). Confirm that your audio and video connections are working properly.
3. **Get started:** Once you begin the visit, perform a rapid assessment to determine if any immediate interventions are needed. For example, does the patient appear very sick, or are they too short of breath to speak? If so, go directly to asking key clinical questions. If no immediate interventions are required, establish what the patient hopes to gain from the visit (i.e., clinical assessment, referral, reassurance).
4. **History:** Ask questions to determine a history of the present illness.
5. **Examination:** Perform a modified physical exam and ask functional inquiry questions.
6. **Vitals:** The patient may be able to take their own measurements if they have access to vitals equipment at home (i.e., blood pressure monitor, pulse oximeter, scale). Interpret results with caution and use them to support findings in the context of your wider assessment.
7. **Decision and action:** Based on your findings, decide if the patient is able to receive the most appropriate care for their condition and if their symptoms can be successfully managed in their location of choice, or if they exhibit red-flag symptoms and require conveyance to hospital.
8. **Report to the patient's most responsible provider.**

Assessment Overview[6]:

1. The purpose of the Virtual Palliative Assessment CPG is to provide paramedics with guidance in assessing and supporting management of symptoms for people who are currently undergoing palliative care or end-of-life experience. These symptoms are most likely to be nausea/vomiting, pain, delirium/agitation, or dyspnea.
2. Drug and non-drug therapies are equally important.
3. Palliative care is an approach that aims to reduce suffering and improve the quality of life for people who are living with a life-limiting illness.
4. The intent of this care is to provide relief from distressing symptoms, not the treatment of any underlying disease process.
5. Palliative care patients are sometimes conveyed to hospital by ambulance when they would have preferred to remain in their own home. The aim of the palliative care pathway is to ensure that palliative care patients receive the most appropriate care for their condition and remain in their own home as per their wishes, when appropriate.
6. Patients approaching end-of-life may experience pain or other symptoms that cause severe distress. These symptoms are usually managed very well by appropriate interventions and medications administered by the primary care/community health/specialty palliative care team, and sometimes by the family members.
7. Patients who are on the BC Palliative Care Benefits Program have a life expectancy of up to 6 months.

8. Hospice services are available in many communities and can serve to offer additional services to people and their families.

Virtual Assessments:

Palliative Assessment (7)		
Section	**Component**	**Question**
MODIFIED EXAM	**Neurological**	Does the patient appear restless, and easily distracted?
		Does the patient appear agitated?
		Does the patient appear to be hallucinating?
		Does the patient appear drowsy or lethargic?
		Does the patient appear to have a decreased level of consciousness?
		Does the patient appear physically or emotionally withdrawn?
	Respiratory	Does the patient appear to have an increased work of breathing?
		Do the patient's respirations appear to be unusually slow or unusually fast?
		Is the patient able to complete a sentence without stopping to breathe?
		Does the patient have a cough? ● If so, does it sound dry or wet? ● Is the cough new onset?
	Circulatory	Does the patient's skin appear pale or cyanosed?
		Does the patient's skin appear clammy or diaphoretic?
FUNCTIONAL INQUIRY	**Psychological**	Does the patient feel restless, or unable to maintain concentration?
		Does the patient feel agitated?
		Is the patient hallucinating?
		Does the patient feel depressed or emotionally withdrawn?

	Neurological	Does the patient feel drowsy?
		Does the patient feel a newer onset of extreme fatigue?
	Pain	Does the patient feel any new pain?
		Has the patient been able to manage their pain effectively?
		Has the patient changed their pain medications since the last visit?
	Respiratory	Does the patient have difficulty breathing? ● Is this new for them, or has their breathing become worse? ○ What makes their breathing feel worse (position, exertion, etc.)? ○ What has the patient tried to feel less short of breath? ■ Have any of these treatments helped?
		Does the patient have a new cough? ● If so ○ Is the cough productive? ○ What colour is the phlegm?
	Circulatory	Does the patient feel any new chest pain/pressure of discomfort?
FOCUSED ASSESSMENT	**Delirium**	Assess for predisposing factors, which include: ● Age over 65 years ● Dementia ● Visual or hearing impairment ● Immobility ● Functional dependence ● Malnutrition ● Substance use ● Multiple chronic comorbidities ● Multiple medications ● Admission to hospital
		Assess for signs and symptoms of delirium, including: Acute onset. ● Fluctuating over the course of a day. ● Attention disturbance; restlessness. ● Altered reasoning/rambling thinking. ● Agitated, angry, emotionally labile, depression, lethargy. ● Disorientation to: time, person and place. ● Sleep-wake cycle disturbance. ● Memory impairment.

- Hallucinations – visual; nightmares.
- Language fluency disturbance.
- Myoclonus, miosis, seizures, tremors (opioid neuro-toxicity) – specific symptoms.
- Tachypnea (sepsis, hypoxemia, central processes) – specific symptoms.

Delirium assessment

- **O**nset
  - When did it begin?
  - How long does it last?
  - How often does it occur?
- **P**rovoking /Palliating
  - What brings it on?
  - What makes it better?
  - What makes it worse?
- **Q**uality
  - What does it feel like?
  - Can you describe it?
  - Do you feel confused?
  - Are you seeing or hearing anything unusual?
  - How are you sleeping?
- **R**egion/Radiation
  - Not Applicable
- **S**everity
  - How bothered are you by this symptom?
  - What would you rate it on a scale of 0-10 (0 being none and 10 being the worst possible)?
    - Right now?
    - At worst?
    - On average?
  - Are there any other symptom(s) that accompany this symptom?
  - Do you know what day/month/year it is?
  - Do you know where you are right now?
  - Can you tell me your full name?
- **T**reatment
  - What medications and treatments are you currently using?
  - Are you using any non-prescription treatments, herbal remedies, or traditional healing practices?
    - How effective are these?
  - Do you have any side effects from the medications and treatments?
  - What have you tried in the past?
  - Do you have concerns about side effects or cost of treatments?
- **U**nderstanding
  - What do you believe is causing this symptom?

		○ How is it affecting you and/or your family? ○ What is most concerning to you? ● **V**alues ○ What overall goals do we need to keep in mind as we manage this symptom? ○ What is your acceptable level for this symptom (0-10)? ○ Are there any beliefs, views or feelings about this symptom that are important to you and your family?
	Fatigue	Assess for underlying causes of fatigue: ● Advanced aging-Frailty ● Liver Failure (end-stage) ● Anemia ● Medications – monitor regularly ● Anorexia - cachexia ● Metabolic disorders ● Autonomic dysfunction ● Muscle abnormalities ● Bleeding ● Neuro-muscular Diseases (ALS, MS) ● Cancer: tumor, host-derived factors, cytokines ● Nutritional deficiencies ● Cardiac disease (CHF) ● Paraneoplastic neurological syndromes ● Central nervous system (CNS) abnormalities ● Psychological issues ● Deconditioning (bed rest/immobility) ● Renal Failure (end-stage) ● Dementia (end-stage) ● Respiratory disease (copd, ild) ● Dehydration ● Side-effects of Treatment ● Endocrine disorders ● Sleep disorders (insomnia) ● Electrolyte imbalances ● Unrelieved symptoms ● Gastro-intestinal symptoms ● HIV-AIDS (end-stage) ● Hypoxemia ● Infection ● Other symptoms (dyspnea, pain, drowsiness, depression) ● Over-exertion
		Fatigue Assessment ● **O**nset ○ When did you start to feel fatigued? ○ How long does it last?

- How often does it occur?
- **P**rovoking /Palliating
  - What brings it on?
  - What makes it better?
  - What makes it worse?
- **Q**uality
  - What does it feel like?
  - Can you describe it?
- **R**egion/Radiation
  - Not Applicable
- **S**everity
  - How severe is this symptom?
  - What would you rate it on a scale of 0-10 (0 being none and 10 being the worst possible)?
    - Right now?
    - At worst?
    - On average?
  - How bothered are you by this symptom?
- **T**reatment
  - What medications and treatments are you currently using?
  - Are you using any non-prescription treatments, herbal remedies, or traditional healing practices?
    - How effective are these?
  - Do you have any side effects from the medications and treatments?
  - What have you tried in the past?
  - Do you have concerns about side effects or cost of treatments?
- **U**nderstanding
  - What do you believe is causing this symptom?
  - How is it affecting you and/or your family?
  - What is most concerning to you?
  - How is this affecting your emotional, spiritual and social health?
  - Have you had to change any of your daily activities?
  - Does it impact your ability to
    - Work?
    - Enjoy hobbies?
    - Exercise?
    - Visit with family and friends?
  - Are there any other symptom(s) that accompany this symptom (e.g., shortness of breath)?
- **V**alues
  - What overall goals do we need to keep in mind as we manage this symptom?
  - What is your acceptable level for this symptom (0-10)?
  - Are there any beliefs, views or feelings about this

- Are there any beliefs, views or feelings about this symptom that are important to you and your family

Pain

Assess for possible causes of pain

Ask the patient to describe their pain

- **O**nset
  - When did it begin?
  - How long does it last?
  - How often does it occur?
- **P**rovoking /Palliating
  - What brings it on?
  - What makes it better?
  - What makes it worse?
- **Q**uality
  - What does it feel like?
  - Can you describe it?
    - If unable to describe, ask is the pain
      - sharp
      - Dull
      - Aching
      - Burning
      - Pins and needles
- **R**egion/Radiation
  - Where is it?
  - Does it spread anywhere?
    - Use a body map to illustrate location and number of pain areas
- **S**everity
  - How severe is this symptom?
  - What would you rate it on a scale of 0-10 (0 being none and 10 being the worst possible)?
    - Right now?
    - At worst?
    - On average?
  - How bothered are you by this symptom?
  - Are there any other symptom(s) that accompany this symptom?
- **T**reatment
  - What medications and treatments are you currently using?
  - Are you using any non-prescription treatments, herbal remedies, or traditional healing practices?
    - How effective are these?
  - Do you have any side effects from the medications and treatments?
  - What have you tried in the past?
  - Do you have concerns about side effects or cost of treatments?

		treatments?
		• **U**nderstanding
		  ○ What do you believe is causing this symptom?
		  ○ How is it affecting you and/or your family?
		  ○ What is most concerning to you?
		  ○ What are your beliefs about opioid/narcotic medications?
		• **V**alues
		  ○ Are you having to make compromises such as decreasing activities or enduring side effects to deal with your pain?
		  ○ What overall goals do we need to keep in mind as we manage this symptom?
		  ○ What is your acceptable level for this symptom (0-10)?
		  ○ Are there any beliefs, views or feelings about this symptom that are important to you and your family

	Dyspnea	Assess for possible causes of dyspnea, including:
		• Pulmonary
		  ○ Airway obstruction
		  ○ COPD/asthma
		  ○ Damage from chemotherapy, radiation or surgery
		  ○ Emboli
		  ○ Fibrosis
		  ○ Effusion
		  ○ Primary or metastatic tumour.
		• Cardiac
		  ○ CHF
		  ○ CAD
		  ○ Arrhythmias
		  ○ Pericardial effusion.
		• Neuromuscular
		  ○ ALS
		  ○ CVA
		  ○ Poliomyelitis
		  ○ Myasthenia gravis
		• Other
		  ○ Anxiety
		  ○ Fatigue/deconditioning
		  ○ Weakness
		  ○ Pain
		  ○ Severe anemia
		  ○ Infection
		  ○ Carcinomatosis
		  ○ Hepatomegaly
		  ○ Phrenic nerve lesion
		  ○ Peritoneal effusion

		Dyspnea Assessment • Onset

- **O**nset
    - When did it begin?
    - How long does it last?
    - How often does it occur?
- **P**rovoking /Palliating
    - What brings it on?
    - What makes it better?
    - What makes it worse?

- **Q**uality
    - What does it feel like?
    - Can you describe it?
    - Is it worse lying down or sitting?
- **R**egion/Radiation
    - Not Applicable
- **S**everity
    - How severe is this symptom?
    - What would you rate it on a scale of 0-10 (0 being none and 10 being the worst possible)?
        - Right now?
        - At worst?
        - On average?
        - When you are walking, climbing stairs, or doing activities of daily living?
    - How bothered are you by this symptom?
    - Are there any other symptom(s) that accompany this symptom (e.g., pain in your chest, anxiety, fatigue)?
- **T**reatment
    - What medications and treatments are you currently using?
    - Are you using any non-prescription treatments, herbal remedies, or traditional healing practices?
        - How effective are these?
    - Do you have any side effects from the medications and treatments?
    - What have you tried in the past?
    - Do you have concerns about side effects or cost of treatments?
- **U**nderstanding
    - What do you believe is causing this symptom?
    - How is it affecting you and/or your family?
    - What is most concerning to you?
- **V**alues
    - What overall goals do we need to keep in mind as we manage this symptom?
    - What is your acceptable level for this symptom (0-10)?
    - Are there any beliefs, views or feelings about this symptom that are important to you and your family?

		○ symptom that are important to you and your family? ○ What are you having trouble doing because of this symptom that you would like to do?
	Respiratory Congestion	Assess for risk factors of respiratory congestion, including: ● A Prolonged dying phase ● Cerebral or pulmonary malignancy ● Pneumonia ● Dysphagia ● Head injury
		Respiratory congestion assessment ● **O**nset ○ When did it begin? ○ How long does it last? ○ How often does it occur? ● **P**rovoking /Palliating ○ What brings it on? ○ What makes it better? ○ What makes it worse? ○ Can the secretions be cleared by coughing or swallowing? ● **Q**uality ○ What does it sound like? ○ Can you describe it? ○ Is it worse lying down or sitting? ● **R**egion/Radiation ○ Does it seem to be in the chest? Or throat? ● **S**everity ○ Does the patient appear comfortable? ○ Are the sounds louder or quieter with change of positions? ○ How bothered are you by this symptom? ○ Are there any other symptom(s) that accompany this symptom? ● **T**reatment ○ What medications and treatments are you currently using? ○ Are you using any non-prescription treatments, herbal remedies, or traditional healing practices? ■ How effective are these? ○ Do you have any side effects from the medications and treatments? ○ What have you tried in the past? ○ Do you have concerns about side effects or cost of treatments? ○ Could other treatments be worsening this symptom (e.g., artificial hydration)? ● **U**nderstanding

		○ What do you believe is causing this symptom? ○ How is it affecting you and/or your family? ○ What is most concerning to you? ○ Does the patient appear distressed? • **V**alues ○ What overall goals do we need to keep in mind as we manage this symptom? ○ Are there any beliefs, views or feelings about this symptom that are important to you and your family?
	Cough	Assess for possible causes of the cough, including: • Cancer state ○ Airway obstruction by tumour ○ Pleural tumor ○ Chemotherapy induced ○ Pulmonary aspiration ○ Acute pulmonary embolism • Non-cancer state ○ End stage weakness ▪ Heart failure ▪ Kidney failure ▪ Respiratory failure ○ ALS ○ CVA ○ MS ○ Late stage dementia
		• Unrelated to primary disease ○ Asthma ○ Chronic bronchitis ○ Infection ○ GERD ○ Sleep apnea
		Cough assessment • **O**nset ○ When did it begin? ○ How long does it last? ○ How often does it occur? • **P**rovoking /Palliating ○ What triggers your cough? ○ What makes it better? ○ What makes it worse? ○ Is it worse in the morning, after a meal, at night? ○ Smoking history/environmental exposures? Is it positional? ○ Can you talk on the phone? Eat? Drink? • **Q**uality ○ What does it sound like? ○ Can you describe it?

- Can you describe it?
- Sputum? If yes:
    - What colour/amount/frequency?
    - Does it contain any blood?
- Does it affect your voice?
- Cause anxiety?

- **R**egion/Radiation
    - Does it feel like it is coming from your chest or throat?
- **S**everity
    - How severe is this symptom?
    - What would you rate it on a scale of 0-10 (0 being none and 10 being the worst possible)?
        - Right now?
        - At worst?
        - On average?
    - How bothered are you by this symptom?
    - Are there any other symptom(s) that accompany this symptom? (e.g., pain, shortness of breath)?
    - Does your cough affect these?
    - Do you have
        - Chills/fever/joint pain?
        - Wheezing?
        - Night sweats/weight loss?
        - Allergies?
        - Reflux?
- **T**reatment
    - What medications and treatments are you currently using?
    - Are you using any non-prescription treatments, herbal remedies, or traditional healing practices?
        - How effective are these?
    - Do you have any side effects from the medications and treatments?
    - What have you tried in the past?
    - Do you have concerns about side effects or cost of treatments?
- **U**nderstanding
    - What do you believe is causing this symptom?
    - How is it affecting you and/or your family?
    - What is most concerning to you?
- **V**alues
    - What overall goals do we need to keep in mind as we manage this symptom?
    - What is your acceptable level for this symptom (0-10)?
    - Are there any beliefs, views or feelings about this symptom that are important to you and your family?

	Nausea and Vomiting	Assess for possible causes of nausea and vomiting, including: ● Chemical ● Cortical ● Cranial ● Vestibular ● Visceral or serosal ● Gastric Stasis (impaired gastric emptying)

		Nausea and vomiting assessment
		● **O**nset
		  ○ When did it begin?
		  ○ How long does it last?
		  ○ How often does it occur?
		● **P**rovoking /Palliating
		  ○ What brings it on?
		  ○ What makes it better?
		  ○ What makes it worse?
		● **Q**uality
		  ○ What does it sound like?
		  ○ Can you describe it?
		  ○ Do you vomit or just feel nauseated?
		  ○ Does it change when you change position?
		● **R**egion/Radiation
		  ○ Not applicable
		● **S**everity
		  ○ How severe is this symptom?
		  ○ What would you rate it on a scale of 0-10 (0 being none and 10 being the worst possible)?
		    ■ Right now?
		    ■ At worst?
		    ■ On average?
		  ○ How bothered are you by this symptom?
		  ○ Are there any other symptom(s) that accompany this symptom?
		● **T**reatment
		  ○ What medications and treatments are you currently using?
		  ○ Are you using any non-prescription treatments, herbal remedies, or traditional healing practices?
		    ■ How effective are these?
		  ○ Do you have any side effects from the medications and treatments?
		  ○ What have you tried in the past?
		  ○ Do you have concerns about side effects or cost of

		treatments?
		● **U**nderstanding
		  ○ What do you believe is causing this symptom?
		  ○ How is it affecting you and/or your family?
		  ○ What is most concerning to you?

		○ What is most concerning to you? ● **V**alues ○ What overall goals do we need to keep in mind as we manage this symptom? ○ What is your acceptable level for this symptom (0-10)? ○ Are there any beliefs, views or feelings about this symptom that are important to you and your family?
	Constipation	Assess for causes of constipation, including: ● Advanced age ● Decreased intake ● Inactivity ● Low fiber diet ● Depression ● Poor fluid intake ● Sedation ● Physical or social impediments ● Bowel obstruction
		Constipation assessment ● **O**nset ○ When did it begin? ○ How long does it last? ○ How often does it occur? ○ When was your last bowel movement? ● **P**rovoking /Palliating ○ What brings it on? ○ What makes it better? ○ What makes it worse? ○ What is your appetite like? ○ How is your daily intake of food and fluids? ○ How is your mobility? ○ Do you need help to the bathroom/commode? ○ Do you have enough privacy? ○ Do you have pain or any other problems? ● **Q**uality ○ What is your normal bowel pattern? ○ Are your bowel movements (BM) less frequent than usual? ○ What do the stools look like? ○ Are they smaller or harder than usual? ○ Do you have discomfort or strain when passing stool? ○ Is there controllable urge or sensation, prior to BM? ○ Are you able to empty your bowels completely when desired? ○ Do you have stool leakage or incontinence? ● **R**egion/Radiation ○ Not applicable ● **S**everity

		• Severity
		  ○ How severe is this symptom?
		  ○ What would you rate it on a scale of 0-10 (0 being none and 10 being the worst possible)?

		■ Right now? ■ At worst? ■ On average? ○ How bothered are you by this symptom? ○ Are there any other symptom(s) that accompany this symptom? • **T**reatment ○ What medications and treatments are you currently using? ○ Are you using any non-prescription treatments, herbal remedies, or traditional healing practices? ■ How effective are these? ○ Do you have any side effects from the medications and treatments? ○ What have you tried in the past? ○ Do you have concerns about side effects or cost of treatments? • **U**nderstanding ○ What do you believe is causing this symptom? ○ How is it affecting you and/or your family? ○ What is most concerning to you? ○ Do you get any other symptoms: ■ Pain ■ Nausea/vomiting ■ Loss of appetite ■ Bloating ■ Gas ■ Blood or mucous in stools ■ Headaches or agitation? ○ Do you have any urinary problems? ○ Do you have any previous trauma which may impact how we manage your bowel movements ■ (e.g., rectal interventions may re-traumatize people with past abuse)? ○ How can we make sure you feel safe and respected? Are you worried about incontinence? • **V**alues ○ What overall goals do we need to keep in mind as we manage this symptom? ○ What is your acceptable level for this symptom (0-10)? ○ Are there any beliefs, views or feelings about this symptom that are important to you and your family?
	Dehydration	Dehydration assessment

- **O**nset
  - When did you start feeling dehydrated?
  - Have you experienced this before?
  - How long does it last?
  - How often does it occur?
- **P**rovoking /Palliating
  - What brings it on?
  - What makes it better?
  - What makes it worse?
- **Q**uality
  - What does it feel like (dry mouth / skin, thirst)?
  - Can you describe it?

- **R**egion/Radiation
  - Not applicable
- **S**everity
  - How severe is this symptom?
  - What would you rate it on a scale of 0-10 (0 being none and 10 being the worst possible)?
    - Right now?
    - At worst?
    - On average?
  - How bothered are you by this symptom?
  - Are there any other symptom(s) that accompany this symptom?
- **T**reatment
  - What medications and treatments are you currently using?
  - Are you using any non-prescription treatments, herbal remedies, or traditional healing practices?
    - How effective are these?
  - Do you have any side effects from the medications and treatments?
  - What have you tried in the past?
  - Do you have concerns about side effects or cost of treatments?
- **U**nderstanding
  - What do you believe is causing this symptom?
  - How is it affecting you and/or your family?
  - What is most concerning to you?
- **V**alues
  - What overall goals do we need to keep in mind as we manage this symptom?
  - What is your acceptable level for this symptom (0-10)?
  - Are there any beliefs, views or feelings about this symptom that are important to you and your family?

Risk Identification:

Traffic light system for identifying risk in palliative patients			
	• **Green Flag - Low Risk** • **Document visit and report as normal**	• **Yellow Flag - Medium Risk** • **Report to Primary Care Provider**	• **Red Flag - High Risk** • **Arrange Transport to Hospital**
Colour (of skin, lips, fingers)	• No new rashes, wounds, or open areas since last contact	•	• New rashes, wounds, or open areas since last contact
Activity	• No change in activity • Walks independently • Walking using aids • No falls since last contact • No new problems with sleeping	• Spends most time in bed, but **can** get out • New difficulties sleeping	• Always in bed • Patient has fallen since last contact
Neurological	• Alert	•	• Confusion • Decreased level of consciousness • New onset distraction • Hallucinations
Respiratory	• No new onset of shortness of breath	•	• New onset of shortness of breath
GI/GU	• Eating and drinking normal, or less than normal • Normal bowel movements	• Eating little due to nausea and/or vomiting • Increased bowel movements • Decreased bowel movements	• Not hungry at all, only drinking fluids • No bowel movements for more than 3 days
Pain	• No new onset of pain • Pain level of <3/10 on pain medication • Utilizes <3 breakthrough doses in 24 hrs	• New onset of pain • Pain level of 3-6/10 on pain medication • Utilizes 3 breakthrough does in 24 hrs	• Pain >6/10 on pain medication • Utilizes >3 breakthrough doses in 24 hrs
Other	• Feels better or the same as the day before • No change in family support • No change to medications • No new problems with anxiety	• Feels worse than the day before • Decrease in family support • Change to medications • New onset of anxiety	•

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Decision and Action:

1. All patients with worsening symptoms (yellow) should be referred to their primary care provider for assessment.
2. Patients with red flag symptoms should be managed without delay. Consult with the patients' usual care team for the creation of a collaborative symptom management plan. If the patients' usual care team is not available, contact the AHPNS. If neither is available or the patient is not under a care team, contact CliniCall (1-833-829-4099 or 604 829-4099) for the creation of a collaborative symptom treatment plan.

References & Further Reading:

1. Telemedicine; Researchers from University of Arizona Detail New Studies and Findings in the Area of Telemedicine (Clinical Examination Component of Telemedicine, Telehealth, mHealth, and Connected Health Medical Practices). Medical Devices & Surgical Technology Week [Internet]. 2018 Jun 10;140. Available from: https://ezw.lib.bcit.ca/login?url=https://search.proquest.com/docview/2047463316?accountid=26389
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3. iPal [Internet]. Hospice Palliative Care Program, Providence Health Care. 2020 [cited 2020 Apr 16]. Available from: https://ipalapp.com/
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8. HHM Supportive Care Interview. Island Health; 2020.

CP 4.1: Home Visits

Updated:
Reviewed:

Purpose

- To outline the standardized procedure for all home visits performed by the Community Paramedic (CP).
- To describe the difference between initial and repeat visits for the same diagnosis.
- To describe the difference between medical and non-medical/educational visits.

Policy Statements

The CP will provide home visits for patients in response to a Request for Service from a primary health care provider or a Health Authority.

The Request for Service form must be received from an appropriate referral source and contain requests for appropriate services to be provided by the CP based on the CP's scope of practice and permitted services.

The referral will include the patient's name, date of birth (DOB), contact information, diagnosis, reason for visit, the requested services to be provided by the CP, and the reporting expectations based on the results found.

Procedure

1. **REVIEW** the patient's health history, care plan, lab results, list of current medications, and any other pertinent information as provided by the referring agency or health care provider. *NOTE: It is important that the CP become familiar with the patient's condition and needs, as much as possible prior to the first visit.*
2. **SCHEDULE** the CP visit with the patient within the first 24 hours. Suggested verbiage for the encounter is, "Your physician has requested that I stop by your home and check in on you. What time would be convenient?"
3. **ARRIVE** at the patient's home in a marked vehicle.
4. **ARRIVE** at the home visit wearing an official BCEHS uniform and with official BCEHS identification.
5. Upon arrival, **EXPLAIN** the purpose of the visit and **OBTAIN** verbal consent.
6. **PERFORM** a home safety screen in conjunction with a falls risk screen on the initial visit. Report any concerns to health care team.
7. **COMPLETE** the initial assessment screen as outlined on the Community Paramedicine Initial Assessment Screen form. The screen and accompanying assessments may be conducted over a few visits based on patient's tolerance, time, and condition.
8. **PERFORM** a head-to-toe assessment, **OBTAIN** a set of vital signs (HR, RR, BP, T, SpO_2), and note any additional assessments (e.g., weight, glucometer reading, capillary refill, pain score, etc.) as requested on Request for Service form/care plan.
9. **PROVIDE** treatment, care, and/or other assessments as outlined on the Request for Service form/care plan.
10. For initial Non-Medical/Educational Visits: **FOLLOW** the same procedures as medical visits, but without vital signs, physical assessments, or treatment services. In consultation with the health care team, the CP may suggest adding more services if indicated after the initial assessment is completed.
11. **COMPLETE** services as requested. If more services are indicated, **CONTACT** the primary health care provider to obtain additional direction.
12. **SCHEDULE** follow-up visit(s) as necessary, or as per primary care provider direction.
13. For subsequent visits under the same referral, **PERFORM** a focused assessment based on the findings from the previous visit(s) and **COMPLETE** the services as requested or as per the care plan.

Documentation

DOCUMENT on the appropriate records:

- Initial health assessment screen on the Community Paramedicine Initial Assessment Screen form.
- Head-to-toe assessment on the Physical Assessment form.
- Vital signs can be plotted on a vital sign graphic record if a trending of vital signs is desired.

- Arrival time, departure time, visit summary, care provided, any additional assessments or services provided, and who/when notified of any concerns on the Community Paramedicine Client Visit Progress Notes.

References

1. Eagle County Paramedic Services. Community Paramedic Protocols Manual. 2013. [Link]
2. Tri-County Health Care Emergency Medical Services. Community Paramedic Policy & Procedure Manual. 2016. [Link]
3. Vancouver Coastal Health. Vancouver Community AOA Practice Guidelines. Initial Assessment Tool – Guidelines for Use. March

CP 4.2: Initial Assessment Screen

Updated:
Reviewed:

Purpose

To assist the Community Paramedic (CP) in observing and documenting objective and subjective information for the purpose of identifying the patient's state of health and comparing it to the ideal. It should be noted that CPs are not authorized to make a diagnosis or clinical assessment. Any findings that are outside the expected range must be reported immediately to the primary health care provider/team unless specified otherwise in the care plan.

Policy Statement

The CP will respond to a request for CP care and will perform a patient health assessment screen during the initial visit to a patient's home. The initial health assessment screen will be documented on the Community Paramedicine Initial Assessment Screen Form. Parts of this screen may be omitted, depending on the situation and the instructions given in the Request for Service/care plan. A more targeted screen may be required based on the individual needs of the patient and the care plan.

Procedure

1. **OBTAIN** verbal consent from the patient to conduct the screen. Be clear regarding signals for 'YES" and "NO" for non-verbal patients and use of communication aids or devices. Ensure translator is present if required.
2. **ASK** questions of the patient, or caregiver if present, and complete pertinent sections of Initial Assessment Screen form as applicable. If specific items are not assessed, √ column and document in additional comments/exceptions the reason(s) for not assessing (e.g., patient declined, assessment not indicated, etc).
3. **UTILIZE** supplementary tools as required: Falls Risk Screen; Braden Scale; Home Safety Assessment Screen; Pain Assessment Tool; and Mental Health Screening tools.
4. **NOTIFY** health care provider/team of concerns that arise from the screen, or for any assessments requiring follow-up.

References

1. Eagle County Paramedic Services. Community Paramedic Protocols Manual. 2013. [Link]
2. Tri-County Health Care Emergency Medical Services. Community Paramedic Policy & Procedure Manual. 2016. [Link]
3. Vancouver Coastal Health. Vancouver Community AOA Practice Guidelines. Initial Assessment Tool – Guidelines for Use. March

CP 4.3: Patient Home Safety Assessment

Updated:
Reviewed:

Purpose

The home safety assessment is designed to provide a detailed walkthrough of the patient's home, identify safety hazards to the patient, and make recommendations when needed.

Using the Home Safety Assessment Checklist (appendix A), the assessment begins at the driveway or walkway and ends at the back yard. It is designed to focus on things such as trip hazards, kitchen safety, adequate lighting in the home and in walk areas, grab bars and lift handles if applicable, and other notable safety features or lack thereof. This assessment is not a mechanical inspection of the home and is not designed to look at the safety of electrical wiring, hot water heaters, plumbing, or any other mechanical features of the home.

Policy Statements

The Community Paramedic (CP) will provide home safety assessments for patients in response to a Request for Service from a health authority or primary health care provider. It is expected that the CP will make recommendations following these assessments, report findings to the primary health care provider, and collaborate with other health care professionals to provide support as appropriate.

Procedure

1. **COMPLETE** the Home Safety Assessment Checklist including inspection of the following areas of the home:
   - Outside the home
   - Living room
   - Kitchen
   - Stairs
   - Bathroom
   - Bedroom
   - General
2. If any safety hazards are found, **MAKE** recommendations and/or referrals as appropriate.
3. **DISCUSS** findings and recommendations with the patient and/or caregiver.
4. **HAVE** patient/caregiver sign the report with the understanding that they understand the recommendations.

Documentation

DOCUMENT home safety assessment on Home Safety Assessment Checklist and indicate that the home safety assessment was completed on Initial Assessment Screen form.

References

1. Eagle County Paramedic Services. Community Paramedic Protocols Manual. 2013. [Link]
2. Tri-County Health Care Emergency Medical Services. Community Paramedic Policy & Procedure Manual. 2016. [Link]
3. Vancouver Coastal Health. Vancouver Community AOA Practice Guidelines. Initial Assessment Tool – Guidelines for Use. March

CP 4.4: Falls Risk Assessment

Updated:
Reviewed:

Purpose

To assist the Community Paramedic (CP) to conduct a falls risk assessment using a variety of falls risk screening tools.

Policy Statements

The CP will conduct a falls risk assessment on clients in response to a referral from a health authority or primary health care provider. It is expected that the CP will document findings and report them to the primary health care provider and collaborate with other health care team members to provide support as appropriate.

The falls risk screen should be conducted in conjunction with a home safety assessment screen to determine if there are any safety hazards that may impact the client's risk for falls within the home environment.

If for whatever reason (cognitive, psychological or physical), the client is unable to perform the screening tests or demonstrates confusion in following instructions, the CP will discontinue testing, document findings, and contact the primary health care provider or team for direction.

A CP does not perform the role of a physical therapist or occupational therapist and will therefore not be analyzing the persons gait or movement, nor advising about exercises or physical therapy. If a CP notices the client is having difficulty moving around, they will bring it to the attention of the primary health care provider, as well as other members of the health care team as appropriate. In addition to connecting the client with the primary health care provider so that appropriate referrals, such as to a physical therapist or occupational therapist, the CP may make suggestions with respect to necessary referrals to organizations that can provide walkers, canes, and other mobility devices.

Definitions

Falls Risk is based on:

- Falls history – a history of falls in the past three months increases the risk of falls
- Timed Get Up and Go (TUG) – clients with a time greater than 15 seconds are at a higher risk for falls
- Romberg test positivity increases falls risk
- Chair stand test – below average rating indicates a high risk for falls
- Tandem stance test – inability to hold stance for 10 seconds indicates a high risk for falls
- Clinical judgment based on observations

Timed Get Up and Go (TUG) test: A quick and simple test to assess an individual's gait and balance by having them rise from a chair, walk a designated distance, and return to the chair and be seated. It measures, in seconds, the time taken by an individual to perform the test. The greater the time, the higher the risk for falls.

Romberg test: A tool used to diagnose sensory ataxia. The test is done by requesting the client to keep their feet firmly together, arms by their side, and eyes open. Balance is noted for 15 seconds, then the client is asked to close their eyes and balance is again noted for 15 seconds. If with eyes open, balance is not good, it may indicate cerebellar ataxia. If closing the eyes causes worsening balance, the test is said to be Romberg positive and indicates that the client is excessively reliant on vision to maintain balance and may indicate sensory ataxia. Clients with either cerebellar or sensory ataxia are at higher risk of falls.

Chair Stand test: A short, easy, and simple test to administer, it assesses the client's leg strength and endurance. It is also useful for tracking improvements in strength and falls risk because it can easily be repeated after implementing interventions. To perform the test, the client sits in a straight back chair against a wall with their feet shoulder width apart, flat on the floor, and with arms crossed over their chest. From the sitting position, the client stands completely up, then completely back down, and repeated for 30 seconds. The total number of complete chair stands (up and down equals one stand) are counted and recorded. A below average rating indicates a high risk for falls.

Tandem Stance test: A short, easy, and simple to administer test of balance. It is also useful for tracking improvements in balance and falls risk because it can easily be repeated after implementing interventions. To perform this test, the client is instructed to stand with one foot in front of the other, heel to toe and to hold this stance for 10 seconds without holding on or taking a step. An individual who cannot hold the tandem stance for at least 10 seconds is at increased risk of falling.

Procedure

1. **ASK** the question: "Have you had a fall in the past 3 months?" If yes, **EXPLORE** further as to what happened, how the fall occurred, what were the circumstances that caused the fall, etc.
2. **PERFORM** one or more of the following screening tests to determine the client's falls risk.
   - **Timed Up and Go test:**
     1. Client should wear their regular footwear and use a walking aid if needed. Select an appropriate chair and mark out a 3 metre distance.
     2. **GIVE** client instructions on how to do the test and allow them to have a practice run before timing.
     3. Using a stopwatch or second hand on a clock/watch, **RECORD** the time it takes the patient to get up from a chair, walk 3 metres, and return to the chair and sit.
     4. **OBSERVE** how the client stands up, with/without using arms; observe stability on turning and any assistance required; observe postural stability, gait pattern, and sway; hearing, vision, and cognition; and proper use of walking aid if used.
   - **Romberg test:**
     1. Instruct the client to stand with feet together, arms at the side, and eyes open. Observe for postural sway or break in position for 15 seconds. If the client sways considerably or breaks position, do not continue.
     2. If minimal/no sway and no break in position, instruct the client to maintain that position and close their eyes for 15 seconds (reassure the client that you will stand close by to catch them should they start to fall).
     3. Individuals with normal balance may sway slightly upon closing their eyes, but it is usually minimal and they should not break position. The Romberg test is positive (abnormal) if the sway is considerable and the client breaks position.
   - **Chair Stand test:**
     1. Instruct the client to sit with back straight in the middle of a chair with their hands on the opposite shoulder, crossed at the wrists, and feet flat on the floor.
     2. Instruct the client to rise to a full standing position and then sit back down again on the word "go". Repeat this for 30 seconds.
     3. On "Go", begin timing and count the number of times the client comes to a full standing position in 30 seconds. If they are over halfway to a standing position when 30 seconds have elapsed, count it as a stand.
     4. Record the number of times the client stands in 30 seconds.
   - **Tandem Stance test:**
     1. Demonstrate how to stand with one foot in front of the other, heel to toe. The client can hold onto a chair until they feel ready.
     2. Instruct the client to let go when you say "**go**" and to keep their feet in this position without holding on or taking a step until you say "**stop**".
     3. Say "**go**" and begin timing. After 10 seconds, say "**stop**".

Documentation

DOCUMENT falls risk screen and screening test results on BCEHS Community Paramedicine Falls Risk Screen Record.

DOCUMENT details of the visit on the CP Initial Assessment Form and/or progress notes and notify primary health care provider or health care team of findings and any concerns.

References

1. Eagle County Paramedic Services. Community Paramedic Protocols Manual. 2013. [Link]
2. General Practice Services Committee. Chronic Disease Management Tools and Resources: Fall Prevention Resources. [Link]
3. McMichael KA, et al. Simple Balance and Mobility Tests Can Assess Falls Risk When Cognition Is Impaired. 2008. [Link]
4. Tri-County Health Care Emergency Medical Services. Community Paramedic Policy & Procedure Manual. 2016. [Link]

CP 4.5: Blood Pressure Monitoring

Updated:
Reviewed:

Purpose

- To provide guidelines for monitoring of patients with suspected or actual hypertension.
- To assist the health care team in the diagnosis of hypertension or to evaluate effectiveness of treatment for hypertension.

Policy Statements

In response to a referral from a health authority or primary health care provider, the Community Paramedic (CP) will follow the monitoring guidelines as outlined below when a request for Blood Pressure Monitoring is made on the Request for Service form and care plan.

Procedure

1. **OBTAIN** and **REVIEW** the patient's health history and care plan prior to the appointment.
2. **REFER** to Request for Service form and care plan for direction with respect to assessments requested and acceptable blood pressure (BP) ranges for systolic and diastolic BP.
3. **OBSERVE** patient's physical state/general well-being. Ensure the patient has voided their bladder and that they are sitting in a relaxed state for at least 2 minutes with both feet flat on the floor, with their arm outstretched and supported at heart level. If the patient is bed-bound, have them lay face up in bed with the arm supported and no contact between cuff and bed or patient.
4. **For orthostatic hypertension evaluation: MEASURE** BP in lying position and then immediately on standing. Report to primary care provider if systolic decreases more than 20 mmHg, or if the patient is symptomatic. If the patient complains of dizziness when going from lying to sitting, take and record BP. Do not proceed to standing.
5. **MEASURE** BP: for each BP recording, at least 2 consecutive measurements at least 2 minutes apart, should be taken. Additional measurements should be taken when the first 2 measurements are quite different. Record the last 2.
    - **Monitoring Schedule: timing, frequency, and duration**
        - **MEASURE** BP twice daily (morning and late afternoon, prior to antihypertensive medications if patient taking any) at about the same times every day or every other day over 2 weeks.
        - **RECORD** readings on BP Monitoring Log.
        - **CALCULATE** average of readings, ignoring the 1st day.
6. **REPORT** readings to Health Care Provider if outside acceptable ranges as per care plan.

Documentation

RECORD date, right (R) or left (L) arm, time, BP, pulse (P), patient position (lying - L; sitting - S; standing - Std) or any changes in position (L → Std), and patient symptoms in log.

NOTIFY primary health care provider of findings and any concerns.

Example documentation on log:

Date	**Limb & Position**	**Morning**		**Symptoms**	**CP** Initials	**Limb & Position**	**Late afternoon**		**Symptoms**	**CP** Initials
		#1	#2				#1	#2		
orthostatic evaluation example	R arm L → Std	1015 (L) 152/92 P 60	1016 (S) 120/90 P 60	Dizziness (std not done)	PD					

BP monitoring example	L arm S	1000 152/90 P 70	1005 148/88	none	PD	L arm S	1600 138/84 P 66	1604 138/88	none	PD

References

1. American Heart Association. Home Blood Pressure Monitoring. 2016. [Link]
2. British Hypertension Society. Home Blood Pressure Monitoring Protocol. 2017. [Link]
3. National Institute for Health and Clinical Excellence. The clinical management of primary hypertension in adults: Clinical Guideline. 2011. [Link]
4. Singh, V. (2015). Home blood pressure monitoring, practical aspects. 2015. [Link]

CP 4.6: Home Medication Self-Management

Updated:
Reviewed:

Purpose

- To determine if the patient and/or caregiver is managing their home medications
- To refer any concerns or questions about the patient's medication self-management to the health care team

Policy Statements

The Community Paramedic (CP) will respond to a request for CP care and will assess a patient's ability to self-manage their medications as part of the initial home visit assessment screen, or as specifically requested on the Community Paramedicine Request for Service.

CPs are not authorized to administer medications to a patient or advise the patient with respect to any changes. It is expected that the CP will document findings and report them to the primary health care provider and collaborate with other health care team members to provide support as appropriate.

Procedure

1. **OBTAIN** and **REVIEW** the patient's health history, current medication list (if available), and care plan prior to appointment.
2. **ASK** the patient and/or caregiver questions regarding medication self-management as outlined on the Initial Assessment Screen form. Use open-ended questions to elicit responses. Some examples include:
    1. What medications do you take?
    2. How do you take your medications? Is that different from how you took them before? How is it different?
    3. What changes has there been to your medications in the last month?
    4. How many times per week do you skip, miss, or forget to take your medications?
    5. Which medications do you take more than 3 times/day?
    6. When was the last time your doctor/NP or pharmacist went over your medications with you?
3. **GENERATE** a list of medications (name, dosage, frequency) the patient is currently taking and compare to the current medication list provided to detect any discrepancies. **NOTIFY** health care provider/team if discrepancies are found.

   NOTE: Client may report their medications using brand names and medication list provided by HCP may use generic names.
4. **ASK** the patient and/or caregiver if there are any other medications, vitamins, or herbal supplements they take that might be from another health care provider, or self-prescribed over the counter, and include these on the list as well.
5. **ASK** patient and/or caregiver to show you their medications and a system they use for organizing them.
6. **CONTACT** referring health care provider if paramedic or patient and/or caregiver have any concerns.

Documentation

DOCUMENT on appropriate records:

- Medication self-management section on Community Paramedicine Initial Assessment Screen form.
- Medication list and discrepancies on Progress Notes.

References

1. Dorman M, et al. Medication Management of the Community-Dwelling Older Adult. In *Patient Safety and Quality. An Evidence-Based Handbook for Nurses. 2008.*
2. Eagle County Paramedic Services. Community Paramedic Protocols Manual. 2013. [Link]
3. Tri-County Health Care Emergency Medical Services. Community Paramedic Policy & Procedure Manual. 2016. [Link]
4. Vancouver Coastal Health. Vancouver Community AOA Practice Guidelines. Initial Assessment Tool – Guidelines for Use. March

CP 4.7: Diabetic Follow-Up

Updated:
Reviewed:

Purpose

To ensure the proper maintenance of blood sugar and insulin levels in the diabetic patient to be accomplished through the patient's ability to self-manage their blood glucose monitoring, appropriate prescription drug usage, recognition of desired drug effects, recognition of hypo/hyperglycemia, and treatment of same.

Policy Statements

In response to a referral from a health authority or primary health care provider, the Community Paramedic (CP) will follow guidelines outlined on the Request for Service form and care plan for follow-up on diabetic patients. It is expected that the CP will document findings and report them to the primary health care provider and collaborate with other health care team members to provide support as appropriate.

Procedure

1. **OBTAIN** and **REVIEW** patient's health history and care plan prior to appointment.
2. **REFER** to Request for Service form and care plan for direction with respect to assessment, patient specific care parameters, and patient teaching as required.
3. **REVIEW** history and physical assessment including health care providers plan for diet, blood glucose targets, and medications.
4. **OBSERVE** patient's physical state/general well-being.
5. **INSPECT** patient's feet and **DISCUSS** foot care with patient and review information as required. Proper footcare is critical for diabetic patients because they are prone to foot problems caused by neuropathy and poor circulation which can lead to loss of feeling in their feet, changes in the shape of their feet, and foot ulcers or sores that do not heal. According to the National Institute of Health, simple daily footcare can prevent serious problems. **REVIEW** the following information about footcare with the patient as necessary:
    - **Check your feet every day**
        - Check your feet for cuts, sores, red spots, swelling, and infected toenails. You may have foot problems, but feel no pain in your feet.
        - Check your feet each evening when you take off your shoes.
        - If you have trouble bending over to see your feet, use a mirror to help. You can also ask a family member or caregiver to help you.
        - Call your doctor right away if a cut, blister, or bruise on your foot does not begin to heal after a few days.
    - **Wash your feet every day**
        - Wash your feet in warm, not hot, water. Do not soak your feet because your skin will get dry.
        - Before bathing or showering, test the water to make sure it is not too hot. You can use a thermometer (32° to 35° C is safe) or your elbow to test the water.
        - Use cornstarch to keep the skin between your toes dry to prevent infection.
    - **Keep your skin soft and smooth**
        - Rub a thin coat of skin lotion or cream on the tops and bottoms of your feet.
        - Do not put lotion between your toes because this might cause an infection.
    - **Smooth corns and calluses**
        - Thick patches of skin called corns or calluses can grow on your feet. If you have corns or calluses, check with your foot doctor about the best way to care for them.
        - If your doctor tells you to, use a pumice stone to smooth corns and calluses after bathing or showering. Pumice stone is a type of rock used to smooth the skin. Rub gently, only in one direction, to avoid tearing the skin.
        - Do not cut corns and calluses.
        - Do not use razor blades, corn plasters, or liquid corn and callus removers - they can damage your skin and cause an infection.
    - **If you can see, reach, and feel your feet, trim your toenails regularly**
        - Trim your toenails with nail clippers after you wash and dry your feet.
        - Trim your toenails straight across and smooth the corners with an emery board or nail file. This prevents the nails from growing into the skin. Do not cut into the corners of the toenail.
        - Have a foot doctor trim your toenails if:

        - You cannot see or feel your feet
        - You cannot reach your feet
        - Your toenails are thick or yellowed
        - Your nails curve and grow into the skin
    - **Wear shoes and socks at all times**
        - Wear shoes and socks at all times. Do not walk barefoot when indoors or outside. It is easy to step on something and hurt your feet. You may not feel any pain and not know that you hurt yourself.
        - Make sure you wear socks, stockings, or nylons with your shoes to prevent getting blisters and sores.
        - Choose clean, lightly padded socks that fit well. Socks that have no seams are best.
        - Check inside your shoes before you put them on. Make sure the lining is smooth and that there are no objects in your shoes.
        - Wear shoes that fit well and protect your feet.
    - **Protect your feet from hot and cold**
        - Wear shoes at the beach and on hot pavement. You may burn your feet and not know it.
        - Put sunscreen on the tops of your feet to prevent sunburn.
        - Keep your feet away from heaters and open fires.
        - Do not put hot water bottles or heating pads on your feet.
        - Wear socks at night if your feet get cold. Choose socks carefully. DO NOT wear socks with seams or bumpy areas. Choose padded socks to protect your feet and make walking more comfortable.
        - Wear lined boots in the winter to keep your feet warm. In cold weather, check your feet often, keep your feet warm, and avoid frostbite.
    - **Keep the blood flowing to your feet**
        - Put your feet up when you are sitting.
        - Wiggle your toes for 5 minutes, 2 or 3 times a day. Move your ankles up and down and in and out to help blood flow in your feet and legs.
        - Do not cross your legs for long periods of time.
        - Do not wear tight socks, elastic, or rubber bands around your legs. Do not wear restrictive footwear or foot products. Foot products that can cut off circulation to the feet, such as products with elastic, should not be worn by diabetics.
        - Do not smoke. Smoking can lower the amount of blood flow to your feet.
    - **Be more active**
        - Being active improves blood flow to the feet. Ask your health care team for safe ways to be more active each day. Move more by walking, dancing, swimming, or riding a bike.
        - If you are not very active, start slowly.
        - Find safe places to be active.
        - Wear athletic shoes that give support and are made for your activity.
6. **MEASURE** and **RECORD** blood pressure and weight.
7. **ASSESS** the patient's understanding of the disease and the positive impacts of a healthy diet and exercise. **ENSURE** the patient is using medications as prescribed and inform the primary care provider if they are not. If the patient is on insulin, ensure correct use of devices and storage of vials (i.e., ensure the patient can visualize the proper amount of insulin they are to inject, utilizing correct injection sites, injection technique and site rotation, changing needles with each injection, not keeping opened/active insulin in the fridge, and ensuring insulin is not exposed to temperature extremes). **REVIEW** information with the patient as required. **INSPECT** injection sites for redness or irritation.
8. **ENQUIRE** about hypoglycemic episodes at each visit. **DISCUSS** recognition and treatment of hypoglycemia as needed.
9. **INSPECT** glucose meter to ensure it turns on when a strip is inserted and does not provide error messages. If not working, **REFER** to pharmacy for new meter.
10. **OBSERVE** the patient as he/she performs blood glucose reading on personal home glucose meter. **ASK** patient to read out loud the glucometer reading. **REVIEW** usage with the patient if required. **ENCOURAGE** the patient to use a new lancet with each poke.

    NOTE: patients should follow SPECIFIC directions from their health care provider regarding frequency of blood glucose monitoring. In the absence of those directions and if not using insulin, testing is only recommended when suspecting hypoglycemia, or if feeling unwell.
11. If blood glucose (BG) is less than 4 mmol/L, or if the patient is experiencing signs and symptoms of hypoglycemia:
    - **ASSESS** vital signs and level of consciousness.

- If airway, breathing, or vital signs are compromised, immediately initiate emergency response.
- **ASSIST** patient with treatment including 15-20 grams of carbohydrate – some suggestions include:
  - 15 g of glucose in the form of glucose tablets/gel (preferred choice) ***OR***
  - 15 mL (3 teaspoons) sugar dissolved in water ***OR***
  - 175 mL (3/4 cup) of juice or regular soft drink ***OR***
  - 6 LifeSavers® (1=2.5 g of carbohydrate) ***OR***
  - 15 mL (1 tablespoon) of honey
- **REPEAT** BG measurement in 10-15 minutes. If BG remains under 4 mmol/L, repeat administration of glucose product(s).
- If their next meal is more than one hour away, they should eat a snack, such as a half- sandwich or cheese and crackers (something with 15 grams of carbohydrate and a protein source).
- **CONTACT** health care provider for further direction.

12. **RECORD** the patient's concerns about treatment (e.g., insulin levels, blood sugar levels, foot problems, etc).
13. **COMMUNICATE** with health care provider or health care team if blood glucose falls outside acceptable parameters as noted on care plan or if any self-care difficulties are noted or suspected such as vision problems or inability to perform own footcare due to mobility, co-ordination, diminished sensation, or other difficulties.

Patient Education Resources

[Canadian Diabetes Association – Diabetes and You]

[Canadian Diabetes Association – Health Living Resources]

[Diabetes – Take Care of Your Feet for a Lifetime]

Documentation

DOCUMENT details of the visit on the CP progress notes and notify primary health care provider or health care team of findings and any concerns.

References

1. Canadian Diabetes Self-Management Education - Help your patient take charge. [Link]
2. Eagle County Paramedic Services. Community Paramedic Protocols Manual. 2013. [Link]
3. National Institute of Diabetes and Digestive and Kidney Diseases. Diabetes - Take Care of Your Feet for a Lifetime. 2014. [Link]
4. Tri-County Health Care Emergency Medical Services. Community Paramedic Policy & Procedure Manual. 2016. [Link]
5. Vancouver Coastal Health. Hypoglycemia in Diabetes: Adult Management Protocol – Acute and Residential. 2013.

CP 4.8: Heart Failure

Updated:
Reviewed:

Purpose

The Community Paramedic (CP) will, in collaboration with the health care team, provide education and regular monitoring of patients with heart failure with the goals of reducing hospitalizations, reducing mortality, and improving the patient's quality-of-life.

Policy Statements

In response to a referral from a health authority or primary health care provider, the CP will visit a patient with heart failure and in addition to performing a focused cardiac assessment, will assess the patient's self-management of the disease including an understanding of their underlying disease, compliance with medications, dietary (i.e., well-balanced low salt/no salt diet, avoidance of processed foods and trans fats, etc) and fluid restrictions, and exercise.

It is expected that the CP will document findings and report them to the primary health care provider and collaborate with other health care team members to provide support as appropriate.

Procedure

1. **OBTAIN** and **REVIEW** the patient's health history and care plan prior to appointment.
2. **REFER** to Request for Service form and care plan for direction with respect to assessment and patient teaching, as required. **REVIEW** prescribed parameters for target weight, sodium restrictions, and fluid restrictions.
3. **ASSESS** patient's/caregiver's understanding of heart failure and rationale for treatment modalities and **REVIEW** any factors known to precipitate or exacerbate heart failure (e.g., non-adherence to dietary sodium restriction, fluid restriction, medication or exercise, continuation of smoking, excessive alcohol use, use of non-prescription NSAIDS – ibuprofen, naproxen, etc). **REVIEW** the patient's record of daily weights.
4. **PERFORM** focused assessment including:
   - Vital signs (T P RR $Sp0_2$)
   - Heart rate and rhythm (regular or irregular)
   - Blood pressure (supine and standing); note if patient is unable to lie supine due to shortness of breath (orthopnea)

     NOTE: patient should be in each position for 2-3 minutes before measurement

     NOTE: when reporting recording, indicate if manual or electronic reading taken
   - Body weight (compare to previous measurements)
   - Cardiac auscultation (heart sounds)
   - Pulmonary auscultation (air entry, crackles, respiratory effort, etc)
   - Check for edema in the most common dependent area; e.g. if standing, check for edema in the feet, ankles, and lower legs; if sitting, check for sacral edema
5. **ENSURE** patient has had their annual flu vaccine and their pneumococcal vaccine.
6. **NOTIFY** primary health care provider if concerns arise and for direction on diuretic adjustment for weight changes above/below parameters.
7. **DISCUSS** with patient/caregiver the patient's self-management strategies: dietary sodium restriction, fluid restriction, exercise, smoking cessation, and prescribed medication adherence. **DISCUSS** with patient the importance of monitoring and recording daily weights at the same time each day. **REVIEW** with the patient their diuretic management plan if weight is above target. **REVIEW** with patient/caregiver their primary care contact and follow-up plan if patient/caregiver become concerned regarding their condition.
8. **PROVIDE** patient/family with the daily weights information sheet and log (if they don't already have one), and any additional resources available via BC Heart Failure Network as needed/requested.
9. **RECORD** patient's/caregiver's concerns about disease and/or treatment and/or self-management strategies.

Documentation

DOCUMENT details of the visit on the CP assessment form and progress notes, and notify primary health care provider or health care team of findings or any concerns.

Patient Education Resources

BC Heart Failure Network

Understanding Heart Failure – Basics

Learning to Live with Heart Failure

Heart Failure Zones

Sodium Restriction

Fluid Restriction

Activity

Exercise

Daily Weight

References

1. American Heart Association. Living with Heart Failure. 2001. [Link]
2. BC Heart Failure Network. Co-Management Resources for Patients and Families. [Link]
3. British Columbia Guidelines and Protocols Advisory Committee. Chronic Heart Failure – Diagnosis and Management. 2015. [Link]
4. Nicholls MG, et al. Disease monitoring of patients with chronic heart failure. 2007. [Link]

CP 4.9: Chronic Obstructive Pulmonary Disease

Updated:
Reviewed:

Purpose

The Community Paramedic (CP) will work together with the health care team in meeting goals of COPD management which include:

- Prevention of disease progression
- Reduction in frequency and severity of exacerbations
- Alleviation of dyspnea and other respiratory symptoms
- Improvement of exercise tolerance
- Prompt treatment of exacerbations and complications
- Improvement in health status
- Reduction in mortality

Policy Statements

In response to a referral from a health authority or primary health care provider, the (CP) will visit a patient with stable COPD. In addition to performing a focused chest assessment, assess the patient's self-management of disease, including an understanding of the need to stop smoking (if applicable), recognition of signs and symptoms of an exacerbation, correct use of inhaler(s), need for flu and pneumococcal vaccinations, and daily exercise.

It is expected that the CP will document findings and report them to the primary health care provider and collaborate with other health care team members to provide support as appropriate.

Procedure

1. **OBTAIN** and **REVIEW** patient's health history, COPD flare-up action plan (if available), and care plan prior to appointment.
2. **REFER** to Request for Service form, care plan, and/or COPD flare-up action plan for direction with respect to assessment, patient specific care parameters/interventions, and patient teaching as required.
3. If the patient is a smoker, **ENCOURAGE** them to quit smoking and suggest smoking cessation strategies such as nicotine replacement therapy, which can be initiated at the community pharmacy level, or suggest he/she speak to their primary care provider for other medications that may help.
4. **ASSESS** patient's current level of dyspnea using a quantitative rating scale (e.g. numeric scale): on a scale 0-10, have the patient indicate how much shortness of breath they are experiencing at the time. 0=no shortness of breath; 10=shortness of breath as bad as can be.
5. **PERFORM** physical exam including:
    - Vital signs (T, P, RR, BP)
    - Pulse oximetry
    - Level of consciousness
    - Chest auscultation
    - Chest wall movement and shape/abnormalities
    - Accessory muscle use
    - Ability to complete full sentence in a single breath
    - Presence of peripheral edema
    - Note worsening of concurrent conditions such as angina or diabetes
6. If patient's self-report of current dyspnea is worse than usual and/or physical exam shows increased work of breathing, such as: escalated RR; HR; increased or decreased BP; diminished breath sounds; end expiratory wheeze and/or inspiratory crackles; shallow inspiratory depth with reduced chest wall expansion; respiratory accessory muscle use; sputum and cough change, or there is worsening of concurrent conditions, **REVIEW** patient's current flare-up action plan for direction. If the patient does not have an action plan, **CONTACT** health care provider for direction.

    NOTE: All patients with COPD should have a flare-up action plan, which often includes having access to steroids and antibiotics that can be initiated at the first sign of an acute exacerbation and does not require a visit to their primary care provider.

7. If no change in usual or current level of dyspnea (RR within normal limits, breath sounds reduced with or without end expiratory wheeze and/or inspiratory crackles, adequate inspiratory depth and chest wall expansion, minimal or no respiratory accessory muscle use, may have clear or white sputum and daily cough), **CONTINUE** with interventions.
8. **ASSESS** patient's understanding of COPD and the disease process, then **REVIEW** the patient's current flare-up action plan and ensure that the patient would be able to access medications if needed (i.e. medications or a prescription on file at the pharmacy). Reinforce to the patient that should a flare-up occur, he/she should notify a health care provider for follow-up.
9. **ENSURE** patient has had their annual flu vaccine and their pneumococcal vaccine.
10. **ASSESS** current use of inhaled medications with the patient and reinforce directions on prescription labels for each inhaler.
11. **OBSERVE** patient using their inhaler device and **REVIEW** technique as needed. If using an aerosolized metered-dose inhaler (MDI), a spacer is strongly recommended. **REVIEW** priming/preparation of inhalers for those that are not used regularly, and cleaning instructions for inhaler device (weekly rinse to prevent medication build-up) and the spacer (wash in warm soapy water weekly and leave to air dry to reduce static). If using a spacer, **CHECK** device for cracks or a broken valve.
12. **ASSESS** self-management strategies: exercise; stress management; nutrition; sleeping patterns; breathing; and coughing exercises.
13. **REVIEW** triggers for exacerbations of symptoms (e.g., poor air quality, smoke, strong fumes, scents, cold air, hot/humid air) and early warning signs of an exacerbation (e.g., worsening dyspnea and work of breathing, change in cough or sputum, etc).
14. **COMMUNICATE** with health care provider or health care team if parameters have deviated from patient's normal ranges as noted on care plan or if any other concerns arise.

Documentation

DOCUMENT details of the visit on the CP progress notes and notify primary health care provider or health care team of findings and any concerns.

Patient Education Resources

COPD – A Guide for Patients

BREATHE – The Lung Association: COPD

BC Smoking Cessation Program

References

1. Bailey LB, et al. Patient Information: Asthma Inhaler Techniques in Adults. In UpToDate. 2015. [Link]
2. BC Guidelines. Chronic Obstructive Pulmonary Disease. 2011. [Link]
3. O'Donnel DE, et al. Canadian Thoracic Society Recommendations for Management of Chronic Obstructive Pulmonary Disease - 2008 Update - Highlights for Primary Care. 2008. [Link]
4. RNAO Nursing Best Practice Guideline. Nursing Care of Dyspnea: the 6^{th} Vital Sign in Individuals with Chronic Obstructive Pulmonary Disease. 2005. [Link]
5. RX Files. COPD: New Drugs, New Devices and Considerations for Best Practice. 2015. [Link]
6. World Health Organization. Chronic Respiratory Diseases – COPD Management. 2016. [Link]

CP 4.10: CPAP, BiPAP, Oxygen Therapy, and Oximetry

Updated:
Reviewed:

Purpose

To assist the health care team in observing and documenting recently diagnosed/chronic sufferers of obstructive sleep apnea or other conditions requiring oxygen therapy to ensure proper ventilation of the patient for the purpose of avoiding long term pathologic outcomes and to ensure that patients are aware of the proper functioning of equipment.

Policy Statements

In response to a referral from a health authority or primary health care provider, the Community Paramedic (CP) will follow guidelines outlined on the Request for Service form and care plan for follow up on patients requiring CPAP, BiPAP, or oxygen therapy.

It is expected that the CP will document findings and report them to the primary health care provider and collaborate with other health care team members to provide support as appropriate.

Definitions

BiPAP: Supports spontaneous respiration by providing a positive pressure on inspiration (IPAP – inspiratory positive airway pressure) and a positive pressure on expiration (IEAP – expiratory positive airway pressure).

CPAP: Supports spontaneous respirations by providing one continuous positive pressure on inspiration and expiration to help stent open obstructive airways.

Sleep apnea: A common sleep disorder in which a person has one or more pauses in breathing or shallow breaths while sleeping. Breathing pauses can last from a few seconds to minutes and can occur 30 times or more per hour. As a result, the quality of sleep is poor, which leads to daytime sleepiness.

Obstructive sleep apnea: The most common type of sleep apnea, occurs when the airway collapses or becomes blocked during sleep. Central sleep apnea is less common and occurs if the area of the brain that controls breathing doesn't send the correct signals to the breathing muscles. As a result, no effort to breathe is made for brief periods (NIH – National Heart, Lung, and Blood Institute; July 10, 2012).

Procedure

1. **OBTAIN** and **REVIEW** patient's health history and care plan prior to appointment.
2. **REFER** to Request for Service form and care plan for direction with respect to assessment and patient teaching required.
3. **REVIEW** equipment usage including equipment care, cleaning, and use of distilled water for humidification with patient/caregiver as required.
4. If patient is recently diagnosed and new to using CPAP/BiPAP, **MONITOR** for hemodynamic instability (i.e., changes in vital signs, capillary refill, urine output, etc).
5. **CONDUCT** assessment:
   - Vital signs including RR, SpO_2, and pulse (check for signal strength on the oximeter, ensuring the SpO_2 and heart rate correlate with pulse rate)
   - Assess sleep habits (shift work? irregular work schedule?)
   - Assess alcohol/recreational drug use
   - Assess use of medication that may affect oxygenation such as benzodiazepines, OTC sleep aids, etc.
6. **ASSESS** quality-of-life and whether there are noticeable changes after usage.
7. **COMMUNICATE** immediately with health care provider or health care team if concerns arise.
8. **INSPECT** equipment and **TROUBLESHOOT** if necessary, including ensuring proper fit of mask and use of machine, as well as general condition of machine.
9. **ENSURE** that patient is connected with necessary resources (oxygen supply company, etc.)

Documentation

DOCUMENT findings and details of the visit on the CP progress notes and notify primary health care provider or health care team of findings and any concerns.

References

1. Eagle County Paramedic Services. Community Paramedic Protocols Manual. 2013. [Link]
2. Tri-County Health Care Emergency Medical Services. Community Paramedic Policy & Procedure Manual. 2016. [Link]
3. Vancouver Coastal Health. *Oximetry Management Guidelines for Community Settings & Residential Care. 2013.*

CP 4.11: Palliative Care

Updated:
Reviewed:

Purpose

The Community Paramedic (CP) will work together with the health care team in supporting goals of palliative and end-of-life care which include:

- Supporting the local palliative/home care team members by being the eyes and ears on the ground.
- Supporting patients and their care givers (family/friends) on understanding around progression of the disease and how to support the patient's wishes for care - includes discussions around ACP (advanced care plans) and goals of care, including MOST (medical orders for scope of treatment).
- Identifying patients who could benefit from palliative care approach (using the iPall-advanced disease tool) and report to primary care.
- Completing assessments, including reporting back to palliative/home care team:
  - Edmonton Symptom Assessment System Revised ('ESAS-r' tool)
  - Palliative Symptom Assessment ('OPQRSTUV' tool)
  - Palliative Performance Scale ('PPSv2' tool)
  - Pain Assessment in Advanced Dementia (PAINAD)
  - Confusion Assessment Method ('CAM' with 'PRISME' tool)
  - Supportive and Palliative Care Indicators Tool (SPCIT)
- Providing support with pain and symptom management:
  - Provide comfort care measures (e.g., repositioning, use of fans for air circulation, etc.)
  - Medication self-management (or as managed by family care givers)
  - Provide patient/caregiver teaching on supportive measures
- Supporting navigation of access to other community supports for the patient and family/friend care givers.

Policy Statements

In response to a referral from, a health authority, or a primary health care provider, the (CP) will visit a palliative patient to assess and support symptom management and discussions around advanced care plans and the patient's goals of care.

It is expected that the CP will document findings and report them to the primary health care provider and collaborate with other health care team members to provide support as appropriate.

Procedure

1. **OBTAIN** and **REVIEW** patient's health history, including MOST form and previous palliative documentation if available, prior to appointment.
2. **REFER** to Request for Service and care plan for direction with respect to assessment, patient specific care parameters/interventions, and patient and/or caregiver education/support as required.
3. **ASSESS** patient's current level of pain, hydration, comfort, nutrition, and functional status (Patient Palliative Scale) as guided by the referring professional.
4. **PERFORM** physical exam, as required, including:
   - Vital signs (T, P, RR, BP)
   - Pulse oximetry
   - Chest auscultation
   - Level of consciousness
5. **PERFORM** assessments, as required, using:
   - Symptom assessments: ESAS-r, OPQRSTUV
   - Pain Assessment in Advanced Dementia: PAINAD
   - Confusion Assessment Method: CAM with PRISME
   - Palliative Performance Scale: PPSv2 tool

6. **SUPPORT** navigation of health system by accessing other support and resources as identified by family/caregivers and engage in conversations, as required, around:
   - Advanced care planning
   - MOST forms
   - Palliative care
7. **PROVIDE** comfort measures as determined by the patient, family, or caregivers such as (but not limited to):
   - Repositioning
   - Use of fans for air circulation
8. **SUPPORT** medication self-management, or as managed by family or caregivers.
9. As determined by assessments completed, continue with interventions outlined in the patient’s care plan.
10. **COMMUNICATE** with health care provider or health care team for changes in patient status and if any other concerns arise.

Documentation

DOCUMENT details of the visit on the palliative assessment forms (where appropriate) and CP Progress Notes, and notify primary health care provider or health care team of findings and any concerns.

Patient Education Resources

1. British Columbia. Advanced Care Planning Resources. [Link]
2. British Columbia. My Voice Guide. [Link]
3. BC Aboriginal Health. (Link to download PDF under 'Brochures' section of Advanced Care Planning website.) [Link]

References

1. Government of British Columbia. My Voice Advance Care Planning Guide Quick Tips (Link to download PDF at bottom of 'Step 1: Download the Advance Care Planning Guide'.) [Link]
2. Government of British Columbia. After Hours Palliative Tele-nursing Support. [Link]
3. Pallium Canada. LEAP Course Learning Materials. [Link]
4. University of Edinburgh. *Supportive and Palliative Care Indicators Tool (SPCIT).* [Link]

CP 4.12: Home Health Monitoring

Updated:
Reviewed:

Purpose

To support the Community Paramedic (CP) in using Community Paramedicine Home Health Monitoring (CPHHM).

Policy Statements

In response to a request for service from a health authority or primary health care provider, the CP may enroll a patient into the CPHHM program. In the absence of an external referral, the CP may enroll the patient into the program, provided that:

1. There is no change in the frequency of patient visits without consultation from the patient's primary health care.
2. CPHHM summary reports are made available to the patient's primary health care provider on a regular basis.
3. The primary health care provider is made aware that the patient is enrolled in the CPHHM program.

Eligibility

- **PATIENTS** > 65 years old
- **PATIENTS** under the care of a Primary Health Care Provider
- **CONFIRMED DIAGNOSIS** of:
  - **HEART FAILURE** *(NB: Currently heart failure CPHHM is not offered in Interior Health's regional jurisdiction.)*
  - **COPD** (Chronic Obstructive Pulmonary Disease)
  - **DIABETES**
  - **PALLIATIVE**
- **COVID-19**
  - COVID-19 questions may also be added to any of the above HHM protocols, based on the clinical assessment of the CP. These questions should be in addition to the patient's own monitoring protocol. Patients with confirmed or presumptive diagnosis of COVID-19 should be referred to public health for monitoring.
- **SUITABILITY** assessment:
  - Willingness to participate in 3 months of a self-management program
  - Able to manage Home Health Monitoring equipment or has a capable caregiver
  - Understands and speaks English or has access to a translator
  - Can stand on a scale unsupported
  - Can follow written instructions
  - Can respond to questions and instructions over the phone
  - Has an internet connection or lives in an area with cellular service
  - Consents to participation in the HHM Service
- **EXCLUSION** assessment:
  - Does not speak or understand English and has no access to a translator
  - Lives in a Residential Care Facility
    - However, residents of Assisted Living would be appropriate for enrolment
  - Lives outside of HHM Service geographical boundaries (if unsure, call the TELUS HHM service desk)
- **IF THE CLIENT IS <u>NOT</u>** eligible or suitable for CPHHM:
  - Notify originating referral source
  - May keep on CP caseload for regular CP services
  - Refer client to other services as required
- **IF THE CLIENT <u>IS</u>** eligible and suitable for CPHHM:
  - Obtain HHM consent for participation in the HHM Service
    - Read the full consent form content to the client as required by Government of BC
    - If the client does not provide consent, consider the client unsuitable and follow the steps as listed above

Documentation

REPORTS may be printed from the Triage Manager software and should be delivered to the Primary Health Care Provider on a regular basis.

Patient Education Resources

1. BCEHS Community Paramedicine. Home Health Monitoring. [Link]
2. BCEHS Community Paramedicine. Home Health Monitoring Brochure. [Link]
3. TELUS Health. Someone to Watch Over Me. [Link]
4. TELUS Patient and Consumer Health Platforms. [Link]

References

1. American Heart Association. Classes of Heart Failure. [Link]
2. Michigan Institute for Care Management and Transformation. LACE Index Scoring Tool for Risk Assessment of Hospital Readmission [Link]

CP 4.13: Community Paramedicine Telehealth

Updated:
Reviewed:

Purpose

To support Community Paramedics (CP) in the use of Zoom and FaceTime as a modality to provide client care, group conferences, and to communicate with staff members.

Scope

In response to Ministerial Order No. M085, Zoom and FaceTime are approved methods to facilitate video conferencing between patients, other health care providers, community members, and staff members for the duration of the COVID-19 pandemic. While both solutions are available, each has their own benefits and limitations.

Telehealth Responsibilities

- **PARAMEDICS** must comply with the following policies prior to using virtual health technology:
    - Patient Consent
    - Privacy & Confidentiality Policy
    - Network Acceptable Use Policy
    - Virtual Health Policy
- **PARAMEDICS** must ensure that they have the latest iOS version. This will ensure that the device has all the latest security features.
- **PARAMEDICS** must not connect to any cloud application when using FaceTime. The iCloud must be turned off. Apple does not store FaceTime on their servers and messages are encrypted end-to-end during transmission. Since iCloud will be turned off, there will be no back up of the FaceTime exchange. Instructions to turn off iCloud can be found here.
- **PARAMEDICS** must comply with any professional standards and practice guidance by the EMALB. For example, privacy and confidentiality, documentation standards, and practice standards for managing personal/professional boundaries.
- **PARAMEDICS** will ensure that the patient is comfortable with using Zoom (or alternatively FaceTime) before using as a modality to provide patient care.
- **DOCUMENTATION** of patient specific care must be included in the patient care record.
- **ZOOM ACCOUNT** creation must be completed through the PHSA Office of Virtual Health.
    - CP must configure their account to give clerk scheduling privileges to the CP Coordinators.

Zoom Procedure

1. **INTRODUCE VIRTUAL HEALTH TO THE PATIENT**
    - Introduce Virtual Health to patients by phone/email/text.
    - Check the technical readiness of your patients.
    - Obtain the patient's personal email and send an initial email to validate their email address and provide notification of risks:
        - Under the Provincial Digital Communications Policy, verbal or digital consent from the patient is acceptable before use of all Virtual Health solutions; however, requirements are:
            - Notification of risks have been provided. See Client Notification Form below.
            - Reasonable efforts have been made to validate the patient's identity. See Patient Email Notification Script below.
    - Healthcare version of Zoom - hosted in Canada with end-to-end encryption. Meeting privacy and security requirements in BC.
    - Patients can join a meeting from their internet browser without needing to download anything. To join, patients simply click the meeting link provided in their email. The link will open their default browser and take them to the meeting.
    - Supported browsers:
        - Windows: IE 11+, Edge 12+, Firefox 27+, Chrome 30+
        - Mac: Safari 7+, Firefox 27+, Chrome 30+
        - Linux: Firefox 27+, Chrome 30+

2. **COMMUNICATE VIRTUAL VISIT INFORMATION**
    - Log into Zoom to schedule the patient's visit(s). A link will be emailed to the patient at this time.
    - Recurring meeting can be set for ease-of-use.
3. **CONDUCT VIRTUAL VISIT**
    - Prior to the visit, choose a private location with reliable internet access (i.e. BCEHS Station) and ensure that there is nothing confidential posted or people moving behind you.
    - At the time of the appointment, click the link in your email invitation or copy and paste the link to your browser.
    - In the unlikely event of technical issues, please switch to a telephone visit with the patient.
    - Supporting materials can be sent to the patient via email or SMS.
    - After the visit, document the encounter in the patient record as usual and report findings to the requesting provider.

Client Notification Form (advised by phone or email prior to virtual health visit)

Notification for the use of Digital Communications

Digital communications can be a convenient way to communicate with your care team between visits, but there are risks when using these technologies to send personal information. We'll do what we can to confirm that any personal information we send is being received by you and only you, but it's never possible to have 100% certainty who we are communicating with outside of a face-to-face visit.

You need to be aware that we cannot control what happens to information once it is stored:

1. On your device;
2. By telecommunications providers;
3. By software or application providers; or
4. By other applications that may have access to your personal information.

You are responsible for the security of your own computer/tablet, email service, and telephone.

Risks of using Digital Communications

The information could be requested, viewed, changed, or deleted if others are allowed access to your phone, tablet, or email account. Information may be vulnerable if stored on a computer/device that has been compromised by viruses or malware.

Organizations may have to disclose information where required by law or under court order. Electronic communications can be intercepted by third parties.

Your data may be stored and/or accessed outside of Canada.

What can you do? The below are suggested best practices meant to help you protect your information once it is in your control. It is important to note that these are general best practices and will not guarantee your information will not be accessed by a third party.

- Protect your passwords! Someone could pose as you by sending us a request from your device or email account.
- Use downloaded apps from trusted sources (Google Play, Apple App Store). If the information you are wanting to communicate is of a sensitive nature, you may want to seek a more secure method of communication.
- Delete emails and texts you no longer require.
- Use your device settings to control what information your apps have permission to access.
- Avoid sending personal information while using public WiFi.
- Use permission controls on your device to ensure that none of your applications (apps) have unnecessary access to your text messages and/or emails.
- Use virus protection on your computer or device and regularly scan.

Patient Email Notification Scripts

Hello,

The BC Emergency Health Services Community Paramedicine program would like to share information with you.

Please respond to this message with the last 4 digits of your Personal Health Number (PHN) to confirm that you are the correct individual and that you consent to these records being sent to [insert patient's email address].

Before you respond, it is important that you understand the potential risks associated with the use of digital communications by reviewing our Notification for the Use of Digital Communications. If you have any questions, please contact me at [CP phone number].

Email tips:

- Do not email or text us if you have an emergency. If you have an emergency, call 9-1-1 or go to the nearest emergency department.
- This email account is not continuously monitored.

Regards,

[Community Paramedic email signature]

References

1. BCEHS Orientation to Telehealth for CPs. [Link]
2. BCEHS Policies and Procedures – Patient Consent (Competent Adult). [Link]
3. Emergency Health Services Act. Emergency Medical Assistants Regulation. [Link]
4. Freedom of Information and Protection of Privacy Act Ministerial Order No. M085. [Link]
5. PHSA Network Acceptable Use Policy. [Link
6. PHSA Privacy and Confidentiality. [Link]
7. PHSA Virtual Health COVID-19 Accessible Solution Toolkit. [Link]
8. PHSA Virtual Health Policy. [Link
9. Vancouver Coastal Health – FaceTime Use Clinical. [Link]
10. Vancouver Coastal Health – Zoom Use. [Link

CP 4.14: Intravenous Initiation by Community Paramedics

Updated:
Reviewed:

Purpose

The Community Paramedic (CP) works together with primary care providers to support patient self-care in the community whenever possible. In some cases, patients who would otherwise self-cannulate or require cannulation for the purpose of self-administration of their medications may request assistance from the CP through the normal referral process.

Policy Statements

In response to a referral from a primary health care provider and following the standardized procedures for CP home visits, the CP may attend a client's residence to initiate intravenous access for the purposes of patient self-administration of medications. This procedure does not include CP administration of any medications.

Such patient interactions will follow the same patient referral, intake, management, and documentation processes as any other CP wellness check.

It is expected that the CP will document the procedure, including all findings, and report them to the primary health care provider and collaborate with other health care team members to provide support as appropriate.

Procedure

1. **OBTAIN** and **REVIEW** patient's health history and care plan prior to appointment.
2. **REFER** to Request for Service form and care plan with respect to assessment, patient specific care interventions, and patient teaching as required.
3. **EXPLAIN** the purpose of the visit and **OBTAIN** verbal consent prior to undergoing any procedure, including vital signs.
4. **PERFORM** physical exam including:
   - Vital signs (T, P, RR, BP)
   - Pulse oximetry
   - Level of consciousness
5. **ASSESS** patient's understanding of the procedure and **DISCUSS** any concerns the patient may have prior to cannulation.
6. **CONFIRM** patency of IV access by flushing with normal saline and secure the catheter. **REVIEW** possible complications with patient and verify understanding of when follow up care from the primary care provider would be required.

   If first 2 attempts to secure IV access are unsuccessful, contact the patient's care team for revised care plan (i.e., direction to continue/discontinue, higher level of care, alternate strategies).
7. **DOCUMENT** the visit and all assessments/treatments on your ePCR as per standard procedure.
8. **COMMUNICATE** with the primary care provider or health care team as noted on care plan or if any other concerns arise.

Documentation

DOCUMENT details of the visit on the CP progress notes and notify primary health care provider or health care team of findings and any concerns.

References

BCEHS IPAC 100	***** Infection Prevention and Control PPE poster***** **Policy IPAC 100 Cleaning & Disinfection Policy** **Procedure IPAC 100.2 Cleaning Disinfection Criteria** **Procedure IPAC 100.3 Routine Post-Transport Cleaning**

	Procedure IPAC 100.4 Routine Cleaning of Ambulance at Each Shift **Procedure IPAC 100.5 Blood & Bodily Fluids Spill** **Procedure IPAC 100.7 Clean and Sterile Supply Storage Guidelines**
6.4.7-v2	**Patient Consent (Competent Adults)**
2.1	**Providing Patient Care within Scope of Practice**
BCEHS OPS 006	**Patient Care Reports**
3.3.4	**Safe Use of Medical Needles**

CP 4.18: COVID-19 Vaccine Administration by Community Paramedics

Updated: 2021-03-04

Reviewed: 2021-03-04

Purpose

The Community Paramedic (CP) works together with primary care providers to support patients in the community whenever possible. In some cases, Registered Nurses, Nurse Practitioners (NP) or Physicians may request assistance from the CP through the normal request for service process to help administer COVID-19 vaccines to patients in clinic or home-based settings.

Policy Statements

This guideline is applicable to any patient over the age of 5 (November 19) and is currently limited to the duration of the emergency or until the Emergency Medical Assistant SARS-Cov-2 Immunization March 18, 2021 is

repealed. Replacing the similarly titled Order of Feb 23, 2021.

The CP should demonstrate the attitudes, knowledge, and clinical skills necessary to provide safe and effective immunization administration. CPs must complete the BCEHS - Community Paramedic Immunization Curriculum, BCCDC COVID-19 Immunization for Children 5-11 Years of Age, BCCDC COVID-19 Viral Vector Vaccines, BCCDC Cultural Safety and COVID-19 Immunization Clinics and BCEHS – Community Paramedic Immunization Competency Sign Off.

CPs can provide the full scope of functions related to the immunizations to patients following a request for service from a Physician or NP in a health authority supervised clinic once "signed off " by the RN, MD, NP.

Homebound Covid vaccination is limited to those health authorities agreeing to provide virtual clinical supervision. Check with Leadership if your local health authority has agreed to that provision.

Guideline

In response to a request for OUTREACH SERVICE from a primary health care provider, and following the standardized procedures for CP patient visits, the CP will: assess, obtain informed consent, prepare and educate the patient, prepare the vaccine, vaccinate, monitor and manage adverse effects and document, in the appropriate public health data base, for all "suitable" clinic patients as requested by the regional Medical Health Officer delegated Physician , Nurse Practitioner or Registered Nurse. Suitability for COVID vaccine is evolving. In all situations of relative contraindication, (i.e. pregnancy, immunocompromised,) the patient should be reviewed by one of these health professionals before proceeding with a vaccination.

In response to provide homebound vaccination an URGENT PRIMARY CARE SERVICE request is required for each address. Homebound Service requires a virtual clinical supervisor be assigned by the Health Authority to support the CP. If this is not provided, the paramedic is not compliant with the PHO and must decline the request.

Procedure

1. OBTAIN Service Request.

   COMPLETE Clinic orientation for available equipment and document entry into COVID data base during clinic. Clinics may work as teams with specific roles or may work as a group of independent practitioners.

2. EXPLAIN the purpose of the COVID vaccine and ASSESS patient's understanding of procedure and discuss any concerns the patient may have prior to immunization administration. COVID Q&A http://www.bccdc.ca/health-info/diseases-conditions/covid-19/covid-19-vaccine/resources-for-health-professionals. Refer to the HealthLinkBC files for the provision of standard information to clients for a respective vaccine.

   CONFIRM Suitability for the Vaccine with an RN< MD or NP if any relative contraindications for the vaccine.

3. **REVIEW** possible complications or reactions with the patient, and **VERIFY** understanding of when follow-up care from the primary health care provider would be required. **REFER** and **FOLLOW** the British Columbia Centre for Disease Control (BCCDC) Immunization Manual for best practice guidance to direct provision of immunization services.
4. **CONFIRM IDENTITY AND OBTAIN** verbal consent prior to undergoing any procedure.
5. REVIEW and FOLLOW Precautions re suitability, and health and vaccine history related to the respective vaccine prior to administration as per the BC Immunization Manual, Part 4 – Biological Products and COVID-19 screening checklist. Product monographs- see below. Vaccine interchangeability is currently under review. Consult with your Supervisor should you become aware of this issue for your patient.
6. **WASH** your hands with soap and water, or use alcohol-based hand sanitizer.
7. VACCINE SPECIFIC CHECK: vial expiry date and REVIEW if for any issues with safe storage.

If previously reconstituted or prefilled syringes - the reconstitution date/time for continued stability for that specific vaccine product.

8. ADMINISTRATION CHECK three times that it is the correct product: 1) when removing from refrigerator/biological cooler, 2) when drawing up/reconstituting and 3) prior to administration.

   PRACTICE the 8 RIGHTS (+ 1 extra) to safe medication administration:
   - RIGHT patient
   - RIGHT drug
   - RIGHT dose
   - RIGHT route
   - RIGHT time
   - RIGHT reason
   - RIGHT frequency - Confirm COVID second dose times
   - RIGHT documentation – in the COVID data base
   - RIGHT location - COVID mRNA vaccines are recommended in the Deltoid

9. **VACCINE ADMINISTRATION**
   - **Intramuscular injection technique:**
     - Expose the area for injection to be able to landmark properly. (Deltoid or vastus lateralis only.)
     - Select the appropriate syringe and needle for the IM site chosen.
       - Recommended needle size and volume for patients > 19 years:
         - Deltoid: 1-1.5", maximum volume 2 mL
         - Vastus lateralis: 1-1.5", maximum volume 5 mL
       - May use smaller needle sizes (5/8" to 1") for those who appear to have smaller frames or muscle size.
     - Draw up vaccine or biological per product instruction.
     - Always read the product-specific page in the BC Immunization Manual, Part 4 -- Biological Products.
     - Palpate the site as the vaccine should not be administered where there is poor muscle mass, existing inflammation, itching, scars, nodules, sensitivity, induration, or pain.
       - **Deltoid:** Define the site by drawing a triangle with its base at the lower edge of the acromion and its peak above the insertion of the deltoid muscle. The injection site is in the centre of this triangle.
         - The upper border of the deltoid muscle is located one to two finger widths below the acromion process. The bottom point of the deltoid muscle can be located by drawing an imaginary line across the arm from the crease of the axilla at the front to the crease of the axilla in the back. The target zone for injection is 4 cm below the acromion for adults.
       - **Vastus lateralis: (NOT recommended for COVID)** When immunizing an adult, position the client in a seated, supine, or side-lying position. Define the site by dividing the space between the trochanter major of the femur and the top of the knee into three parts; draw a horizontal median line along the outer surface of the thigh. The injection site is in the middle third, just above the horizontal line.
     - Cleanse the injection site with a new alcohol swab by circling from the centre of the site outward for 2.5-5 centimetres. Let dry.
     - Place your thumb and forefinger of non-dominant hand on either side of the injection site and press the area flat. Insert the needle at a 90 degree angle. Aspiration is not necessary, however if blood is noticed in the needle hub, the needle should be immediately withdrawn and discarded. A new syringe and needle with vaccine should be prepared.
     - Remove the needle. Activate the safety mechanism and discard into the sharps container.
     - Use gauze and apply gentle pressure to the injection site.
     - Use of bandage is not routinely recommended but may be preferred by the client.
   - Once all documentation is complete, discard all empty vials into the sharps container.

10. **COMMUNICATE** with the primary care provider if any other concerns arise. It is recommended that all immunized clients remain in the clinic for 15 minutes post-immunization. This may facilitate the management of any adverse reactions.

11. **REVIEW** BCCDC Immunization Manual For BC -- Part 5: Adverse Events Following Immunization. **REFER** to the BCEHS Anaphylaxis Guideline in the event of a severe adverse reaction.

12. **REPORT** any adverse events following immunization immediately to the primary health care provider.
    - Phase 1: Adverse events will be reported to the public health unit by the primary health care provider running the flu clinic.

- Phase 2: Adverse events will be reported to the public health unit by the community paramedic and/or BCEHS.

Documentation

In Clinic - DOCUMENT in the approved Public health immunization record (EFORMS, IMMS BC, or Downtime FORM) provided by the Health Authority. See below for required documentation.

DOCUMENT on the written patient record/card and give to the patient for their records.

PROVIDE the patient a personal immunization record card with the following information:

- Name of vaccine
- Dose or amount given
- Route
- Initials and title of person administering the vaccine

In clinic - No additional BCEHS documentation required. No documentation on Health Authority systems is authorized.

Homebound patient – DOCUMENT - As above on the public health record provided. (Eforms (HA approved access only), IMMS BC - (IRIR will work if set up) or use a Downtime form.

DOCUMENT for the patient personal record as above.

DOCUMENT in SIREN ePCR on the CP Immunization section. DOCUMENT on appropriate records as noted above.

Please note, as per the BC Immunization Manual, Appendix B - Administration of Biological Products, the following should be documented:

• Name of the biological product

• Date
• Route of administration
• Anatomical site

• Name of the biological product manufacturer
• Lot number
• Name and title of the person administering the biological product
• Any reactions following immunization
• Any recommended biological products that were not given (i.e., declined, deferred, or contraindicated)
• Informed consent for immunization obtained

PROVIDE the patient a personal immunization record card with the following information:

- Name of vaccine
- Dose or amount given
- Route
- Initials and title of person administering the vaccine.
- Record any additional assessments, reactions, or follow-up care on appropriate records.
  If you consulted either your virtual Clinical Supervisor or Clini-call - document that in SIREN consultations.

References

1. BCCDC Immunization Manual
   - Informed Consent
   - Immunization Schedule
   - Administration of Biological Products
   - Reducing Immunization Injection Pain
   - Contraindications and Precautions for Immunizations
   - Principles of Immunology
   - Adverse Events Following Immunization
     - Management of Anaphylaxis in a Non-hospital Setting
   - Guidance for Receiving and Handling the Pfizer-BioNTech COVID-19 mRNA Vaccine (including dry ice procedures)

2. BCEHS Anaphylaxis Guideline
3. Vaccine Safety (BCCDC)
4. Canadian Immunization Guide (Government of Canada)
5. COVID-19 mRNA Vaccine BNT162b2 (Pfizer-BioNTech)
6. COVID-19 mRNA Vaccine mRNA-1273 (Moderna)
7. COVID-19 Vaccine Screening Checklist
8. COVID-19 Vaccine After Care Sheet
9. Community Paramedic Ministerial Order
10. Emergency Medical Assistants SARS-CoV-2 Immunization Order – February 23, 2021 (PDF)

COVID CP 101.1 Procedure for Community Paramedics Attending Community Events During COVID-19 Pandemic

1. APPLICABILITY

a. Rationale

Community paramedics may take part in community outreach programs and health promotion opportunities whenever an appropriate request is received, and the activities requested are within the community paramedics (CPs) scope of practice and permitted activities. Safety precautions for participants during the COVID-19 pandemic are also included.

b. Scope

This procedure applies to all paramedics when fulfilling the role of a community paramedic who are arranging attendance at a community event, outreach program or health promotion during BC's Restart Plan. All CPs must ensure that community events align to the respective phase/step of the restart plan.

2. PURPOSE

a. Standard Operating Procedure

To provide a standard operating procedure that all community paramedics MUST follow for community events.

b. COVID-19 Precautions

To provide extra guidance on COVID-19 precautions and considerations required for community events.

3. PROCEDURE

a. The Request

Confirm the Request for Outreach Service is completed including:

i. Signature(s)
ii. Anticipated Attendees.
iii. Location Details.
iv. Safety Precaution (as detailed below)

b. Safety Protocols

Review the safety protocols in place for the location of the event, which may include, but not limited to:

i. Physical distancing measures
ii. Hand hygiene policies
iii. Cleaning and disinfecting products – see Resource 5.vi. below.

iv. Regular cleaning and capacity limits in washrooms, community/event rooms, kitchens, etc.

c. **COVID-19 Precautions**

i. Event plans align and adhere with the current step in effect of BC's Restart Plan:

a. Step 1 (effective May 25 2021):
   i. Physical distancing
   ii. Mask requirements
   iii. Outdoor seated gatherings up to 50 with COVID Safety plan
   iv. Indoor seated gatherings up to 10 with COVID Safety plan

b. Step 2 (earliest June 15, 2021)
   i. Physical distancing
   ii. Mask requirements in public indoor settings
   iii. Outdoor seated gatherings up to 50 with COVID Safety plan
   iv. Indoor seated gatherings up to 50 with COVID Safety plan

c. Step 3 (earliest July 1, 2021)
   i. Careful social contact
   ii. Mask recommendation in public indoor settings
   iii. Increased capacity at indoor and outdoor seated gatherings with COVID Safety plan (i.e. fairs and festivals can operate)

d. Step 4 (earliest Sept 7, 2021)
   i. Normal social contact
   ii. Masks in public indoor settings is a personal choice
   iii. Increased capacity at indoor and outdoor seated gatherings (i.e. concerts)

ii. Confirm the following COVID-related conditions are in place, as outlined above:

a. Maintain 2 meters of physical distance when possible.
b. Increase protective measures for vulnerable populations.
c. Ensure that layouts are rearranged to support safe distancing including markers on the floor/ ground to designate areas and directions to move through spaces. Increase environmental cleaning (common spaces, high-touch surfaces, shared equipment). tissues/waste baskets are required.
d. Follow hand hygiene practices prior to and upon conclusion of the event:

i. Provision of access to hand hygiene products, i.e. soap and water and paper towels or an alcohol-based hand sanitizer (at least 70% alcohol).

e. Increase ventilation (e.g. outside spaces preferred, open windows/doors in rooms, etc.)
f. Discourage participants from gathering prior to or after the event.
g. Screening/assessment will be in place for monitoring participant's symptoms of COVID-19 upon day of the event. Coordinating/hosting facility/group is responsible for this screening, unless event is organized by the CP in which case the CP is responsible for the screening. REFERENCE: Point-of-care Risk Assessment (PCRA) for COVID-19

iii. Ensure PPE is followed:
   a. Appropriate PPE is required for community events with NO contact with attendees (procedural masks).
   b. Events WITH attendee contact, full PPE is required (elastomeric half-mask, gloves, face shield).

iv. The following individuals should not participate in organized events:
   a. Any person who receives a diagnosis of COVID-19. Individuals must comply with the current mandated self-isolation policy as per the BC Ministry of Health (www.gov.bc.ca).
   b. If any symptoms of COVID-19 (fever, cough, sore throat, runny nose, headache, or shortness of breath) are present, the individual cannot participate.
   c. Any person who lives in a home with or has been in close contact with someone with symptoms of COVID-19.
   d. Any person who has arrived in British Columbia from outside of Canada within the last 14 days as they are mandated to self-isolate and monitor for symptoms for 14 days upon their arrival.

d. Approval & Scheduling

i. During the COVID-19 pandemic, all requests must be sent to CommunityParamedicine@bcehs.ca for approval prior to scheduling.
ii. Once approved, schedule the event in iScheduler (via CP Coordinators) and proceed with next steps.

e. Event Preparation

i. Ensure to document the request and approval (printed copy of email) in the community event file.
ii. Research the topic and/or look in the CP Team Site (SharePoint) Shared Content Library for existing resources.

iii. Gather equipment required and/or develop presentation materials.
iv. Practice presentation delivery.
v. Prepare a Community Event Attendance Record

f. Event Promotion

Information shared should include:

i. Event date, time, location
ii. Intent of event and target audience/participants
iii. Health & safety precautions in place for COVID-19
   a. Encourage use of non-medical mask by participants (will not be supplied by BCEHS) – see Section 5 v below.
iv. If any attendee(s) are feeling sick, they must stay home. No exceptions.
v. A reminder that International travelers returning to B.C. must have completed a period of self-isolation for 14 days and complete a self-isolation plan as required by law prior to attending the event.
vi. Contact and/or sign-up information.
vii. Further information/details about the event, as required.

g. Event Setup

i. Arrive at the venue wearing an official BCEHS uniform, an employer supplied procedural mask and official BCEHS identification.
ii. Greet any co-facilitators and discuss the sessions plan.
iii. Ensure safety precautions are in place, as outlined in your event planning and in collaboration with any event partners. If precautions are not adhered to, CPs will be unable to attend.
iv. Setup any tables, seating, equipment and/or materials required.

h. During the Event

i. Greet attendees.
ii. Ensure each attendee is screened (see prior to entering the room/site.
iii. Have each attendee perform hand hygiene upon entry.
iv. Have each attendee sign the Community Event Attendance Record and assess for any COVID-19 related health concerns.
v. Share safety information about the session including COVID-19 precautions (i.e. hand hygiene practices, physical distancing, etc.)
vi. Acknowledge the ancestral lands where the event is taking place.
vii. Provide services as agreed upon

i. Closing the Event

i. Thank attendees and remind them to clean their hands upon exiting the session.
ii. Clean and disinfect all equipment, tables, chairs, etc. ensure wet contact time of the product is achieved prior to packing away.

j. Document the Event

i. Update Community Event paper file with any additional information.
ii. Place the Community Event Attendance Record into the paper file.
iii. Close out the event in iScheduler.

4. DOCUMENTATION

Document on appropriate records:

i. Community Event Attendance Record
ii. CP Community Event File

5. RESOURCES

i. BCEHS. Community Paramedicine Policy 101 Community Paramedics Attending Community Events during COVID-19. July 2020.

ii. BCEHS. Community Paramedicine Policy 3.3 Community Paramedicine Service Delivery. Nov 2016.

iii. BCEHS. (2020) COVID-19: Information for BCEHS Staff. https://intranet.bcas.ca/areas/provincial-programs/Disaster-Risk-Reduction-and-Resilience/covid-19.html

iv. BCEHS. (Sept 2016) EXPOSURE CONTROL PLAN (Part 2) - Infection Prevention and Control (EPC-IPAC) https://intranet.bcas.ca/areas/qsrma/ipac/pdf/exposure-control-plan-part2-ipac.pdf

v. BCCDC Masks. http://www.bccdc.ca/health-info/diseases-conditions/covid-19/prevention-risks/masks

vi. BCCDC Environmental Cleaning. http://www.bccdc.ca/Health-Professionals-Site/Documents/COVID-19_MOH_BCCDC_EnvironmentalCleaning.pdf

vii. COVID-19: Infection Prevention and Control Guidance for Community-Based Allied Health Care Providers in Clinic Settings. http://www.bccdc.ca/Health-Professionals-Site/Documents/COVID19_IPCGuidelinesCommunityBasedAlliedHCPsClinicSettings.pdf

viii. BC Ministry of Health. *ORDER OF THE PROVINCIAL HEALTH OFFICER: Mass Gatherings Order*. May 22 2020.

ix. BC Ministry of Health. *ORDER OF THE PROVINCIAL HEALTH OFFICER: Workplace COVID-19 Safety Plans*. May 14 2020.

x. Public Health Agency of Canada. (2020). Coronavirus Disease. https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19.html

xi. BC Ministry of Health. (2020). COVID-19 (Novel Coronavirus). https://www2.gov.bc.ca/gov/content/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/current-health-topics/covid-19-novel-coronavirus

xii. Government of Canada. (2020). Risk Mitigation Tool. Retrieved from https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/mass-gatherings-risk-assesment.html

6. REVIEW SCHEDULE

Procedure Adopted:	July 2nd 2020	Procedure Owner:	Director, Strategy & Transformation
Next Review Scheduled:	September, 2021	Reviewer:	Community Paramedicine

7. VERSION HISTORY

Date	Update	Number	Title	Details
July 2 2020				Initial Version
June 1 2021			A. Poll, I/Director, Strategy & Transformation	Revised policy to reflect BC's COVID Restart plans

CP 4.19: Influenza Vaccination

Reviewed: 2023-01-03

Purpose

The Community Paramedic (CP) works together with primary care providers to support patients in the community wherever possible. In some cases, Nurses, Nurse Practitioners or Physicians may request assistance from the CP through the normal request for service process to help administer influenza vaccines to patients.

Policy Statements

The CP should demonstrate the attitudes, knowledge, and clinical skills necessary to provide safe and effective immunization administration. In order to provide Influenza vaccinations, CPs must have completed:

- BCCDC Online Immunization Competency Course
- Foundations of Influenza: Disease & Vaccine
- Seasonal Influenza Updates 2021/22
- Immunization Communication Module

CPs can provide the full scope of functions related to the immunizations following a request for service from a Physician or Nurse Practitioner in a Health Authority supervised clinic once “signed off” by the RN, MD or NP.

Homebound influenza vaccination is limited to those Health Authorities agreeing to provide virtual clinic supervision. Check with leadership if your local Health Authority has agreed to that provision.

Guideline

In response to a request for OUTREACH SERVICE from a primary health care provider, and following standardized procedures for CP patient visits, the CP will:

- Assess the patient, obtain informed consent, prepare, and educate the patient
- Prepare the vaccine, administer the vaccine, monitor, and manage any adverse events
- Document, in the appropriate public health database, all suitable clinic patients as requested by the regional Medical Health Officer delegated Physician, Nurse Practitioner or Registered Nurse

In response to provide homebound vaccination an urgent primary care service request is required for each address. Homebound service requires a virtual clinical supervisor be assigned by the Health Authority to support the CP. If this is not provided, the paramedic is not in compliance with the PHO, and must decline the request.

In all situations of relative contraindications, the patient should be reviewed by one of the aforementioned health professionals before proceeding with vaccination.

Procedure

1. Obtain service request
   - Complete clinic orientation for available equipment and document entry into database during clinic. Clinics may work as teams with specific roles or may work as a group of independent practitioners.
   - For homebound patients, conduct a clinical review of suitability, liaising with home support team and consulting with a virtual clinical supervisor prior to administration.
2. Explain purpose of the Influenza vaccine and assess patient’s understanding of procedure and discuss any concerns the patient may have prior to immunization.
   - Confirm suitability for vaccine with an RN, NP or MD if any relative contraindications exist
   - Use BCCDC Q&A resources to support discussions with patient
3. Review possible complications or reactions with the patient and verify their understanding of when follow-up care from the primary health care provider would be required.
   - Refer to and follow the BCCDC immunization manual for best practice guidance to direct provision of immunization services
4. Confirm identity and obtain verbal consent prior to undergoing any procedure
5. Wash your hands with soap & water, or with alcohol-based hand sanitizer
6. Review any issues with safe storage of vaccine

- Check three times that it is the correct product: 1) when removing from refrigerator, 2) when drawing up/reconstituting and 3) prior to administration

7. Practice the 8 RIGHTS of safe medication administration:
    - Right patient
    - Right drug
    - Right dose
    - Right route
    - Right time
    - Right reason
    - Right frequency
    - Right documentation
8. Administer vaccine
    - Always read product-specific page in the BC Immunization Manual, Part 4 – Biological Products to ensure vaccine is prepared appropriately
    - Select appropriate site for administration
    - Use sterile technique for administration of intramuscular injections
    - Practice principles of safe sharps handling
9. Communicate with the primary care provider if any other concerns arise. It is recommended that all immunized clients are observed for 15 minutes post-immunization and stay on-site for a total of 30 minutes.
10. Review BCCDC Immunization Manual, Part 5 – Adverse Events Following Immunization as required. If severe adverse reaction, refer the BCEHS CPG E09: Anaphylaxis.
11. Report any adverse events following immunization immediately to the primary health care provider

Documentation

In Clinic:

- Document in the approved public health immunization record provided by the Health Authority
- Provide the patient with a personal immunization record card with the following information:
    - Name of the vaccine
    - Dose or amount given
    - Route
    - Initials and title of person administering vaccine
- No additional BCEHS documentation is required.

Homebound:

- Document as above on the public health record provided
- Document in Siren ePCR on the CP immunization section:
    - Name of the biological product
    - Date
    - Route of administration
    - Anatomical site
    - Name of the biological product manufacturer
    - Lot number
    - Name and title of the person administering the biological product
    - Any reactions following immunization
    - Any recommended biological products not given (declined, deferred, or contraindicated)
    - Informed consent for immunization obtained
- Provide the patient with a personal immunization record card with the following information:
    - Name of the vaccine
    - Dose or amount given
    - Route

    - Initials and title of person administering vaccine
- If you consulted with your virtual clinical supervisor (i.e., health authority MD/NP/RN) and/or CliniCall, document this in Siren under Procedures

References & Supporting Resources

1. BCCDC Immunization Manual
    - Appendix A: Informed Consent
    - Part 1: Immunization Schedules
    - Appendix B: Administration of Biological Products
    - Appendix D: Reducing Immunization Injection Pain
    - Appendix C: Contraindications and precautions for immunizations
    - Appendix F: Principles of Immunology
    - Part 5: Adverse Events following Vaccination
2. BCEHS CPG E09: Anaphylaxis
3. BCCDC Vaccine Safety
4. Government of Canada Immunization Guide
5. 2021/22 Seasonal Influenza Vaccine Eligibility

CP 4.15: COVID-19 Testing by Community Paramedics

Updated: 2020-12-16

Purpose

The Community Paramedic (CP) works together Public Health Authorities (HA) and local community providers to support patients in the community whenever possible. As a result of a Nov 16, 2020 Public Health Officer Order, Nurses, Nurse Practitioners (NP) or Physicians (MD) may now request assistance from the CP through the normal request to support the testing of community members for COVID 19.

Policy Statements

The CP must demonstrate the attitudes, knowledge, clinical skills and safe management and transport of COVID specimens in order to provide safe and effective COVID testing to patients greater than 5 years of age. This will be done in two phases Phase 1 - CPs will respond to a designated HA COVID Testing centre (SOP1) and later in Phase 2 - to a Patient home (SOP 2) to preform COVID testing, this will be rolled out in early 2021.
CPs are responsible for successfully completing the on-line COVID Testing course materials (set according to BCCDC standards). CP will demonstrate proficiency in infection control, PPE practices, COVID symptom assessments, and guiding self administered sampling technique(s). In addition, the invasive nasopharyngeal swabbing techniques is a new skill, and therefore, in addition to the on-line training, this skill must be “signed off” by a HA approved “trainer” (RN, NP, or MD). CPs must be able to educate the patient/caregiver on post testing isolation behaviors and obtaining results follow up. In Phase 2, education will be required for CPs to support the practice of safe handling and transport of “dangerous goods” samples as per Ministry of Transport Temporary Orders.
In all situations, all testing equipment and necessary supplies will be provided by the Health Authority, as well as the full responsibility for specimen transit to the designated lab. As well, the responsibility for providing the CP orientation to specific equipment and documentation management will remain with the HA. COVID supplies and approaches have changed rapidly. This document is in effect as of December 16,
2020; however, this may be updated frequently. CP are required to check for updates prior to arriving for a booked testing time.

Guideline

Once training is complete, the CP may respond to a Health Authority or Primary Care Provider request for a maximum of a 4-hour period on regularly scheduled workday to assistance with COVID Testing of patients over age five. Referrals will follow one of two COVID Testing SOPs:
1. SOP 1 (Phase 1) Surge Support to a Health Authority Testing Center
2. SOP 2 (Phase 2) Home testing at the request of a Health Authority or designated Practice Provider.
This practice guideline will focus on the required clinical skills and knowledge required for COVID testing.
REFER to and FOLLOW the British Columbia Center for Disease Control (BCCDC) for best practice guideline for viral testing the Elsevier requirements, as mandated in the order.

Procedure

1. OBTAIN
a. The necessary supplies, including PPE, testing materials, and if necessary, cooling materials, and transport materials. If intending on using self-performed gargle sampling, access to both methods should be available in case the patient has not properly prepared for the gargling method. A supply check list will be available for home-based testing (Phase 2).
b. The test requisition and confirmation the patient is at 5 years or older. If not connect with the referring provider/or testing site leader. Acceptable requisitions may be from BCCDC (paper) or the Health Authority (electronic).

2. DON PPE for COVID 19 protection. BCEHS PPE Poster

3. CHECK using 2 or 3 Factor–ID that the patient and requisition match. Add any missing requisition information to the requisition, such as the patients GP or NP for follow-up. Refer to PHSA Policy and BCEHS Policy

4. EXPLAIN the purpose of the test and ASSESS patient’s /caregivers understanding of procedure and discuss any concerns the patient may have prior to COVID 19 Testing. This constitutes your verbal consent to proceed.
a. REFER to: COVID-19: Adult Viral Testing Guidelines for British Columbia
b. REFER to: COVID-19: Pediatric testing guidelines for British Columbia

5. CHECK for test eligibility or contra-indications

a. Confirm the presence of COVID symptoms (this may have been done already at the testing site)
b. Complete the ILI screen for COVID symptoms
c. Confirm required preparations were accomplished: i.e.
- Gargle tests requires one hour - no eating or drinking. If not properly prepared a nasopharyngeal swab may be substituted if no contraindications.
- If nasal passages for the Nasopharyngeal swab are not blocked/ active epiglottitis (Figure 1).

6. INVOLVE THE PATIENT
a. Nasopharyngeal swabbing is invasive, set up a system of notification if the patient finds it too painful to proceed.
b. Explain to Caregiver how they help with sample collection or positioning a child. Do a test gargle with young children.

7. COMPLETE the appropriate TEST
a. Nasopharyngeal swab
b. Self-administered gargle for children and adults
c. Self-administered nasal swab (use of this test is pending)

8. MANAGE any unintended consequences. (i.e. nasal bleeding)

9. REVIEW with the patient/caregiver post testing
a. The need for Isolation and Home management for an isolated family member
- BC COVID-19 Symptom Self-Assessment Tool for COVID-19
- FAQ's from patients

10. PROVIDE patient/caregiver with any HA hand out materials

11. VERIFY patient/caregivers understanding of:
a. Follow-up for COVID symptom health care.
b. How to obtain test results.
i. If Positive Public Health Contact tracer will call within in 3 days (may be longer due to access to labs).
ii. If Negative, the patient must contact their GP Or NP or review the BCCDC web site if they have no primary health care provider.

12. DOCUMENT as directed by the Health Authority (Paramedics will document on all paper requisitions; HA will work to develop an alternative solution for computerized records such as the support of an administrator.

13. LOCATE the specimen in the provided biohazardous sample container(s) in an appropriate temperature-controlled environment as directed by the HA requirements.

14. TRANSPORT (applicable in Phase 2 Home Testing only): follow the guidelines for safe transport to a HA drop off site for transfer to a lab.

15. COMPLETE iScheduler record including number of patients seen.

TESTING SPECIFICS:
A. PPE
As per Work Safe requirements BCEHS will be conducting a Risk assessment for CP PPE use at HA authority testing sites, the assessment may result in a change of the PPE required, until then CPs will follow PPE requirement for COVID 19 which is known to meet or exceed the requirements. It is noted that BCEHS PPE requirements may differ from the Health Authorities.
CPs will follow the latest procedure for use PPE according to the latest BCEHS standard when doing Home visit testing.

B. COVID TESTING
INVASIVE NASOPHARYNGEAL SWAB:
1. Inform the patient of the process of sampling, possible discomfort and a warning signal if the patient needs the paramedic to stop.
2. Inspect the throat for evidence of Epiglottitis, if uncertain, invite an additional review by another Health Provider.

3. Provide Kleenex to the patient to clear the airways.
4. Insert the swab as per learning: Adult BCCDC video (A&P) and basic swab technique)
5. Ensure specimen is secured and labeled as per Health Authority guidelines.
6. Ensure there is no bleeding from the nose or pharynx.
7. Document sampling time, etc. on requisition
8. Store sample in the provided temp controlled storage. (Swabs are stable at room temperature for 24 hours.

SELF Testing GARGLE SAMPLING: (Child or Adult)

1. Assess for the patient's compliance with 1-hour food restrictions.

If not compliant: inform the patient of the need to sample using the nasopharyngeal approach (see above).

2. Review the gargle sampling process – ensure the patient understands not to swallow ANY sampling fluid. Young children may need a practice session first. Children's Hospital video
3. Ensure specimen is secured and labeled as per Health Authority guidelines. This specimen must be kept at fridge temperatures. Place on an ice pack if any delay.
4. Inform the patient of the timing and process of obtaining results (1 – 3 days; may vary by HA or sampling process).
5. Provide a HA handout about results reporting if available.
6. Document sampling time, etc. on paper requisition or request.
7. Insert into bio/hazard bag or other appropriate storage devise.
8. Store in provided temperature-controlled storage. Samples must remain at fridge temperatures.

C. TRANSPORT TO LAB

In both Phases, it is the responsibility of the hosting Health Authority clinic to arrange for storage according to cold chain requirements and arrange for transportation to the appropriate lab.

In Phase 2 (Home based COVID testing), the related SOP will contain information regarding safe packaging for transport between the patient's home and the HA drop off location.

Documentation

DOCUMENT on patient record provided by primary health care provider or the BCCDC Paper Requisition.

References & Supporting Resources

1. BCCDC COVID-19 Testing Guidelines:
    a. Informed Consent, BCCDC
    b. COVID-19: Adult testing guidelines for British Columbia
    c. COVID-19: Pediatric testing guidelines for British Columbia
    d. Specimen Collection For adults and older youth
    e. Specimen Collection For Children and youth
2. BCEHS PPE Resources
3. Provincial Health Order for Community Paramedic COVID Testing

CP 4.20: Vitamin B12 Injection

PURPOSE

The Community Paramedic (CP) works together with primary care providers to support patients in the community wherever possible. In some cases, Nurses, Nurse Practitioners or Physicians may request assistance from the CP through the normal request for service process to help administer Vitamin B12 injections for patients with anemia or other clinical indications.

POLICY STATEMENTS

The CP should demonstrate the attitudes, knowledge, and clinical skills necessary to provide safe and effective immunization administration. In order to provide Influenza vaccinations, PCP CPs must have completed the following course and received the associated EMALB Schedule 2 endorsement. RACCPs may provide the service without this additional training.

- BCEHS – Administration of Vitamins in the Out-of-Hospital Setting

CPs can provide the full scope of functions related to Vitamin B12 injections following completion of the required training and EMALB Schedule 2 endorsement, including administration and management of any adverse events.

GUIDELINE

In response to a request for URGENT PRIMARY CARE SERVICE from a primary health care provider, and following standardized procedures for CP patient visits, the CP will:

- Retrieve the Vitamin B12 injection from local source
- Assess the patient, obtain informed consent, prepare, and educate the patient
- Prepare the injection, administer the injection, monitor, and manage any adverse events
- Document, in Siren, the therapy or therapies and assessment provided on this visit

PROCEDURE

1. Obtain service request, establish dosing frequency and identify where CP may retrieve the Vitamin B12 Injection
2. Explain purpose of the Vitamin B12 Injection and assess patient's understanding of procedure and discuss any concerns the patient may have prior to injection
3. Review possible complications or reactions with the patient and verify their understanding of when follow-up care from the primary health care provider would be required
4. Confirm identity and obtain verbal consent prior to undergoing any procedure
5. Wash your hands with soap & water, or with alcohol-based hand sanitizer
6. Practice the 8 RIGHTS of safe medication administration:
    1. Right patient
    2. Right drug
    3. Right dose
    4. Right route
    5. Right time
    6. Right reason
    7. Right frequency
    8. Right documentation
7. Administer Injection
    1. Select appropriate site for administration
    2. Use sterile technique for administration of intramuscular injection
8. Practice principles of safe sharps handling
9. Communicate with the primary care provider if any other concerns arise. It is recommended that all clients are observed for 15 minutes post-injection
10. If severe adverse reaction, refer to BCEHS CPG E09: Anaphylaxis and request emergency ambulance response
11. Document injection in Siren and inform primary care provider of administration once patient event complete

DOCUMENTATION

Homebound:

- Document in SIREN ePCR under Procedures:
  - Dose administered
  - Route of administration
  - Any reactions following injection
- If you consulted with the primary care provider or CliniCall, document in SIREN under Procedures

REFERENCES & SUPPORTING RESOURCES

1. BC Guidelines – Cobalamin (Vitamin B12) Deficiency
2. National Institutes of Health – Vitamin B12 Fact Sheet for Health Professionals
3. BCEHS CPG E09: Anaphylaxis

CP 4.21: Subcutaneous Butterfly Placement

PURPOSE

The Community Paramedic (CP) works together with primary care providers to support patient self-care in the community whenever possible. In some cases, patients who require insertion or reinsertion of subcutaneous access for the purpose of administration of their own medications may request assistance from the CP through the normal process.

POLICY STATEMENTS

The CP should demonstrate the attitudes, knowledge, and clinical skills necessary to provide safe and effective subcutaneous access for the purposes of administration of the patient's own medications, most often in a palliative setting.

CPs can provide the initial or re-establishment of subcutaneous access to allow the patient to administer their own medications. It is expected that the CP will document the procedure, including all findings, report them to the primary care provider and collaborate with other health care team members to provide support as appropriate.

CPs must have successfully completed the required online education and undertaken a face-to-face education session with a CP Mentor or Paramedic Practice Educator (PPEd).

GUIDELINE

In response to a request for URGENT PRIMARY CARE SERVICE from a primary health care provider, and following standardized procedures for CP patient visits, the CP will:

- Assess the patient, obtain informed consent from patient or parent, prepare, and educate the patient and/or parent
- Review the indication for subcutaneous access establishment and identify a suitable site for insertion
- Insert a subcutaneous catheter and assess patency
- Document the procedure and any complications in Siren, reporting this information back to the primary care provider

PROCEDURE

1. Obtain service request.
2. Obtain and review patient's health history and care plan prior to their scheduled appointment.
3. Explain the purpose of the procedure and obtain verbal consent prior to undergoing any procedure, including vital signs.
4. Perform physical examination as required, including vital signs.
5. Assess patient understanding of the procedure and discuss any concerns the patient may have prior to insertion
6. Gather equipment and supplies.
7. Following the Clinical Procedure Guide PR24: Subcutaneous Butterfly Placement (**exception: CPs do NOT need to contact CliniCall prior to insertion**), insert the catheter into one of the preferred injection sites:
    1. Upper arms
    2. Abdomen
    3. Anterior aspect of thighs
    4. Above scapula
    5. Subclavicular chest wall
8. Ensure access site is easily accessible, free of lesions, away from large vessels, joints and bones and away from edematous tissue which may alter medication absorption.
9. Assess site for redness, swelling, tenderness, leakage or discharge. If any of these are present, re-site the catheter.
10. Review possible complications with patient and verify patient understands when follow-up care from primary care provider would be required.
11. Document the visit and all assessments/treatments on your ePCR as per standard procedure.
12. Communicate with the primary care provider or healthcare team as noted on care plan or if any concerns arise.

DOCUMENTATION

In Siren:

- Use "Procedures" tab in Siren to access applicable buttons

- Select IV/IO/Arterial Access button
- Under “Type” select “Subcutaneous Procedure”

REFERENCES & SUPPORTING RESOURCES

1. BCEHS – Palliative Care Clinical Practice Guidelines
2. BCEHS – Subcutaneous Butterfly Placement

CP 4.22: Hypodermoclysis

PURPOSE

The Community Paramedic (CP) works together with primary care providers to support patients in the community wherever possible. In some cases, Nurses, Nurse Practitioners or Physicians may request assistance from the CP through the normal request for service process to help administer subcutaneous rehydration therapy (hypodermoclysis) to patients in the community.

POLICY STATEMENTS

The CP should demonstrate the attitudes, knowledge, and clinical skills necessary to provide safe and effective immunization administration. To provide hypodermoclysis, CPs must have completed the required education to initiate and maintain subcutaneous catheters.

GUIDELINE

In response to a request for URGENT PRIMARY CARE SERVICE from a primary health care provider, and following standardized procedures for CP patient visits, the CP will:

- Assess the patient, obtain informed consent, prepare, and educate the patient
- Prepare the infusion, initiate the infusion, monitor, and manage any adverse events
- Document, in Siren, the therapy or therapies and assessment provided on this visit

PROCEDURE

1. Obtain service request, establish volume required, dosing frequency and/or duration and required patient education.
    1. Patients should be supported to self-discontinue infusions once complete if the CP will no longer be present
2. Explain purpose of hypodermoclysis and assess patient's understanding of procedure and discuss any concerns the patient may have prior to therapy
3. Review possible complications or reactions with the patient and verify their understanding of when follow-up care from the primary health care provider would be required
4. Confirm identity and obtain verbal consent prior to undergoing any procedure
5. Wash hands with soap & water, or with alcohol-based hand sanitizer
6. If not already in place, insert subcutaneous catheter in accordance with CP4.21: Subcutaneous Butterfly Placement
7. Practice the 8 RIGHTS of safe medication administration:
    1. Right patient
    2. Right drug
    3. Right dose
    4. Right route
    5. Right time
    6. Right reason
    7. Right frequency
    8. Right documentation
8. Initiate infusion of Normal Saline (if Lactated Ringers is requested, must be supplied by requesting clinician)
    1. Calculate appropriate drip rate for volume to be infused over specified time period (Volume in mLs x gtts / duration of infusion in mins)
    2. Generally maximum infusion rate of 40-60mL/hour up to 1L in 24 hours
    3. After an infusion of 1L through one site, subcutaneous catheter site may need to be shifted following assessment
9. If severe adverse reaction, refer to CPG E09: Anaphylaxis and request emergency ambulance response
10. Document infusion in Siren and inform primary care provider of administration once patient event complete

DOCUMENTATION

Homebound:

- Document in SIREN ePCR under Procedures:
    - Volume administered whilst in the home

    - Planned volume for infusion
    - Any reactions following injection
- If you consulted with the primary care provider or CliniCall, document in SIREN under Procedures

REFERENCES & SUPPORTING RESOURCES

1. Broadhurst, D. Cooke, M. Sriram, D. & Gray, B. (2020). Subcutaneous hydration and medications infusions (effectiveness, safety, acceptability): a systematic review of systematic reviews. *PLoS One, 24*(15), e0237572. DOI: 1371/journal.pone.0237572
2. Caccialanza, R. Constans, T. Cotogni, P. Zaloga, GP. & Pontes-Arruda, A. (2018). Subcutaneous infusion of fluids for hydration or nutrition: a review. *J Parenter Enteral Nutr, 42*(2), 296-307. DOI: 1177/0148607116676593
3. Radcliffe, C. (2017). *Guideline for the use of subcutaneous hydration in palliative care.* Specialist Palliative Care Audit and Guidelines Group. Available from: https://www.palliativedrugs.com/download/180214_Subcutaneous_hydration_in_palliative_care_v 4_Final.pdf
4. BCEHS CPG E09: Anaphylaxis

PR01: Ambulating Patients

Applicable To

EMR and higher

Introduction

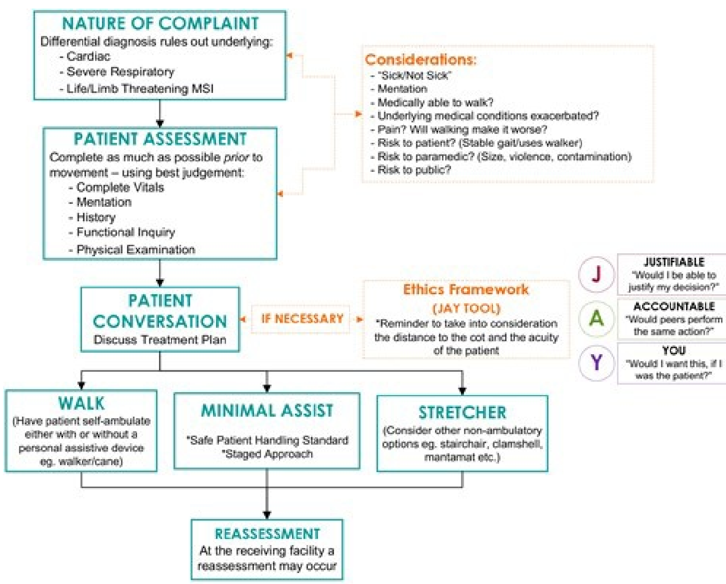
When it is clinically safe for both the patient and the paramedic or EMR, patients should ambulate on their own, or with appropriate support. There are, however, clinical situations in which a stretcher or non-ambulatory method of patient movement should be utilized. Proper assessment will reduce the risk of patient falls and associated risk of injury to patients and paramedics and EMRs/FRs.

The following criteria can be used as a tool to assist in deciding which patients should be conveyed via stretcher, or other non-ambulatory method, and which patients can safely self-ambulate.

Although these guidelines are meant to provide support in the decision about what to do and how to do it, there can be extenuating or unforeseen issues that complicate circumstances. If a situation arises where there is uncertainty about the correct course of action, pause and reflect for a moment. Consider the BCEHS Ethics Framework; specifically, the use of the JAY Decision Making Tool (page 12) for in-the-moment decision-making. The JAY Tool can help individuals to consider all the factors involved before they make a final decision about what to do.

Procedure

The BCEHS Patient Movement Assessment Tool



Steps for Applying the BCEHS Patient Movement Assessment Tool

The paramedic or EMR may consider some or all of these points when applying the BCEHS Patient Movement Assessment Tool:

STEP 1: Nature of the Complaint/General Impression

- Differential Diagnosis (consider Mechanism of Injury)
  - When the differential diagnosis indicates one of the following, these patients warrant a stretcher:
    - Cardiac in nature
    - Severe respiratory complaint with clinical indicator(s) (e.g., shortness of breath with audible wheezes, decreased SpO_2 saturations, etc.)
    - Life/Limb threatening MSI

- **Considerations** – these considerations may warrant a stretcher or be mitigated by other assistive devices:

1. *Consider the patient's acuity:*
   - "Well" or "Not well"
   - Mentation: Is the patient able to follow a conversation? Is the patient cooperative? Is eye movement consistent with intentional cooperation?
   - Are they medically able to walk?
   - Are there underlying medical conditions that may be exacerbated?
   - Is the patient in pain and will walking the patient make the pain worse?
2. *Consider the risks:*
   - Risk to the patient; stable gait; do they normally use a walker?
   - Risk to the paramedic or EMR/FR; size of the patient; potential for violence or contamination?
   - Risk to the public?

STEP 2: Patient Assessment

- Complete as much as possible prior to movement to help confirm or deny your thoughts formulated during Step 1 – using best judgement:
  - Complete vital signs (are they normal for THIS patient?)
  - Assessment of mentation: GCS and/or LOC x3 (Time, Place, Person) to help determine suitability of ambulation
  - History
  - Functional inquiry
  - Physical examination

STEP 3: Patient Conversation

- A discussion with the patient about the treatment plan allowing them to be part of the decision making process
- Reminder: In this situation the distance to the stretcher is taken into consideration based on the acuity of the patient

Ethics framework (JAY tool)

- Depending on the situation, paramedics and EMRs may need to use this tool

STEP 4: Walk, Minimal Assist, Stretcher

- Walk – self ambulate with or without an aid
- Minimal assist
  - PHSA Safe Patient Handling Standard and FAQ
    - If it is assumed the patient will need more than minimal assistance, it is recommended the patient be moved using a non-ambulatory method.
  - See the Staged Approach to Safe Patient Movement graphic below

STEP 5: Reassessment

- At the receiving facility, a reassessment may occur as the patient's condition and/or abilities may have changed

Notes

Staged Approach to Safe Patient Movement

- **Safe Patient Handling Standard:** Please note that this assessment tool works in accordance with the PHSA Safe Patient Handling Standard which states that patients should not be manually lifted if it can be avoided and is not detrimental to the patient's health. Please review the standard and associated FAQ.
- Manually lifting a patient who can safely walk is not a desirable option. However, a high risk of injury to patient and paramedic or EMR/FR is associated with ambulating a patient at risk of falling. Proper assessment is critical in reducing the risk of falls.
- Do not rely on the patient's spoken communication to determine if it is safe for them to ambulate. Upon completion of your assessment (as outlined in the Patient Movement Assessment Tool above), proceed to assess the patient's ability to move. From the patient's starting position, use the Staged Approach to Safe Patient Movement to guide your decision-making on how to move the patient; this assessment stops when the patient is not able to move on to the next level with no more than minimal assistance. At this point, stop and consider a stretcher or assistive device.

Patient Assessment:

- **Before ambulating a patient, be sure the patient:**
  - Has passed the **Patient Movement Assessment Tool (see above)** and no contraindications are indicated
  - Is cooperative, alert, and able to follow directions
  - Can move from lying to sitting and balance while sitting independently or with minimal assistance
  - Can stand up and balance independently or with minimal assistance
  - Can step in place while maintaining balance independently or with minimal assistance
  - Has the ability to self-transfer the distance required (do not over-estimate the patient's capabilities)
- **Important points:**
  - Clear the environment – ensure no tripping hazards
  - Ensure mobility aids, if used, are within reach – on their strong side if possible
  - Ensure patient is wearing non-slip footwear if available
  - *Do not attempt to catch a falling patient; attempt to control the direction of the fall and protect the patient's head*

Procedure for Staged Approach:

Assist the patient from lying to sitting. If the patient cannot do this independently or with minimal assistance, do not walk the patient.

With patient sitting up:

- Check that patient's feet are flat on the floor and knees and hips are approximately 90 degrees (sitting surface should not be too low), with feet behind knees
- Have patient move to the edge of sitting surface
- Cue patient for proper hand placement (e.g., push on mattress or chair armrests)

Stand to the side of the patient and support the patient at the back (option to hold the patient's belt if present to stabilize). Use a walker or other mobility device if this is standard practice for the patient.

Assist patient to standing position by reminding patient to have "nose over toes" and to lean into standing (cue patient to push down to get up). The paramedic or EMR should direct the movement and may provide minimal assistance by supporting the patient under their belt, elbow, or wrist. The patient should not grasp the paramedic or EMR/FR and should not be in a position to pull the paramedic or EMR/FR down at the shoulders should they fall.

Ensure patient is able to maintain balance in a standing position. If balance is questionable, sit the patient back down and re-evaluate or proceed with non-ambulatory methods of transfer.

Once the patient is clearly maintaining balance in standing, check that the patient is able to step on the spot while continuing to maintain balance prior to ambulating, using a mobility aid as applicable. If balance is questionable while stepping, sit the patient back down and re-evaluate or proceed with non-ambulatory methods of transfer.

If the patient can step in place and you feel safe to proceed, assist the patient (by guiding and or cuing) to ambulate to the destination. If walking in a hallway, stay close to the wall.

Once the patient has completed their trip, ensure seating surface is positioned squarely behind the patient's knees, the device is locked as applicable, the device is adjusted to an appropriate height when possible, and then instruct the patient to sit down.

- Provide a verbal reminder to patient: "Can you feel the seat behind your knees?"
- Verbally cue the patient to reach behind to help guide and support themselves while lowering: "Reach behind yourself with one hand to the seat to help let yourself down."
- Minimally assist the patient as needed to an appropriate sitting or lying position.

Resources

Staged Approach to Safe Patient Movement

Patient Starting Position	Patient Ability			
	YES ⇩	Can patient move to and maintain balance in a seated position independently, or with minimal assistance?	NO ⇨	**Patient Non-Ambulatory** *Use available equipment to safely transfer patient to stretcher.*
	YES ⇩	Can patient stand, pause in standing and maintain balance independently or with minimal assistance?	NO ⇨	
	YES ⇩	Can patient step in place and maintain balance independently or with minimal assistance?	NO ⇨	
	YES ⇩	Can patient take steps and maintain balance to walk independently or with minimal assistance?	NO ⇨	
	✓	**Patient Appropriate to Walk**		

Edited May 20/2023 to remove broken links

References

BCEHS. Ethics Framework. 2017. [Link]

Provincial Health Services Agency. Workplace Health - Safe Patient Handling. [Link]

PR02: Pelvic Binders

Applicable To

FR and higher

Introduction

If a pelvic injury is suspected, or there is a high mechanism of injury in an unconscious patient, the pelvis should be bound with a T-POD or KED. Binding the pelvis reduces overall pelvic volume and creates a tamponade effect, stabilizes fracture fragments reducing hemorrhage from the fracture sites, and improves patient comfort.

Pelvic binders should not be used for isolated neck-of-femur (NOF) fractures (also known as "hip" fractures).

Indications

Major mechanism suggestive of pelvic fracture with **any** of the following:

- Hemodynamic instability (heart rate > 100 or systolic blood pressure < 90 mmHg)
- Pelvic pain on exam
- Pelvic instability
- Decreased level of consciousness
- Major injury distracting from pelvic exam

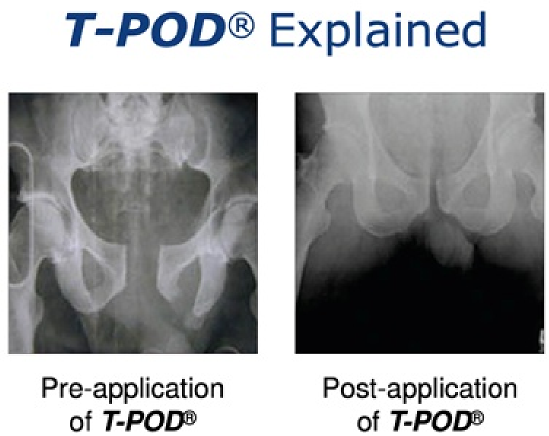
Contraindications

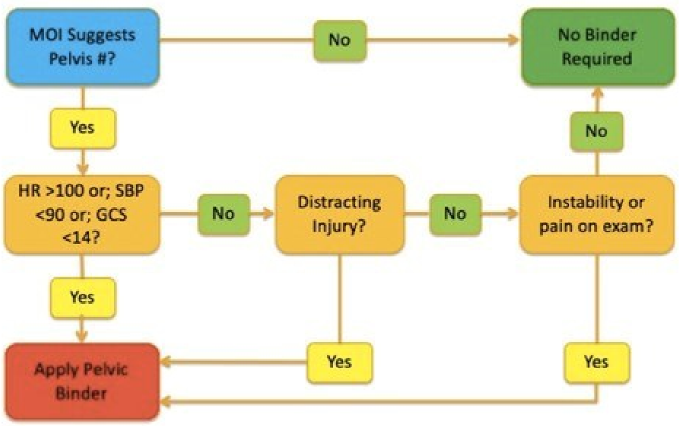
- Neck-of-femur ("hip") fractures
- Falls from standing height or other simple falls

Procedure

1. Remove the patient's clothing. The T-POD should be in direct contact with the skin.
2. Slide the belt under the supine patient and into position under the pelvis, aligning the centre of the belt with the greater trochanter.
3. Trim the belt leaving a 15 to 20 cm gap over the centre of the pubic symphysis.
4. Apply the Velcro tension straps.
5. Slowly draw tension creating simultaneous, circumferential compression.
6. Record the date and time of application.
7. Secure the belts to ensure constant pressure without accidental release.
8. If release is required, or occurs accidentally, the time of this event should also be noted.
9. Document the application of the T-POD on the ePCR under 'Major Trauma: Intervention: Circulation.'

Notes





Resources

Numerous tutorial videos available online.

PR03: Tourniquets

Applicable To

FR and higher

Introduction

Tourniquets are indicated for severe bleeding from trauma to extremities where other methods of bleeding control have proven ineffective. Most bleeding can be controlled through direct pressure, elevation, and immobilization, but occasionally injuries can be significant enough to require tourniquet use.

Indications

- Bleeding from an extremity that cannot be controlled through direct pressure or wound packing

Procedure

1. Identify uncontrolled external bleeding.
2. Make one attempt at control with direct pressure.
3. If unable to control bleeding with direct pressure and the wound is on an extremity: position the tourniquet 5 – 8 cm above the injury, or as high on the limb as possible. Do not apply over joints. Remove clothing and ensure tourniquet is in direct contact with skin.
4. Secure tourniquet strap through the buckle, pull the strap until it is snug, and apply tension using the windlass until all bleeding has stopped. Lock the windlass into position and secure using the strap.
5. Note the time of application. Document the procedure in the ePCR.
6. Consider providing analgesia to the patient in accordance with CPG E08.

Notes

Tourniquets should not be in place for more than 2 hours. Contact CliniCall if scene management and/or transport times may exceed this timeframe.

Resources

PR04: Wound Packing

Applicable To

FR and higher

Introduction

Wound packing is a technique of internal direct pressure that places gauze material directly on the lacerated blood vessels in an attempt to control bleeding.

Indications

- Wound packing is indicated for penetrating wounds where bleeding cannot be controlled using direct pressure alone. It is an ideal technique for injuries to junctional areas of the body, including the groin and axilla, where tourniquets are ineffective and direct pressure can be difficult to maintain.

Contraindications

- Do not pack wounds on the neck, chest, or abdomen. There is a risk of airway compromise when packing neck wounds. Wound packing is unlikely to be effective on the chest or in the abdomen due to the nature of these injuries.

Procedure

1. Ensure appropriate protective equipment is used, including eye protection or face shields.
2. Obtain and open multiple packages of gauze. Sponges may be used if roll gauze is not available.
3. Insert fingers into the wound to provide direct pressure on the target blood vessels; ideally, the artery or vein (or both) should be compressed against a bone while packing material is being readied.
4. Pack the wound tightly with gauze. Continue applying pressure during the packing process, alternating fingers if necessary. Ensure the packing material reaches as deeply into the wound cavity as possible.
5. When the wound cannot accommodate any more packing material, apply very firm direct pressure to the wound and packing material for at least three minutes to allow the clotting process to begin. If bleeding continues, consider packing more material into the wound.
6. Secure the wound packing with a pressure dressing and convey immediately (if not already en route). Immobilization of the injury may help to limit recurrence of bleeding.

Resources

References

PR05: Patient Decontamination

Rob MacMillan

Applicable To

- FR and higher

Introduction

Patient decontamination is any process, method, or action that leads to a reduction, removal, or neutralization of an agent. This can be accomplished by partitioning, binding, or inactivating a contaminant on, or within, a patient. It is intended to prevent or mitigate adverse health effects to a patient as well as aid in protecting emergency first responders, health care facility first receivers, and other patients from secondary contamination. Decontamination also facilitates access to medical care and reduces the potential for secondary contamination of incident response and health care infrastructure.

When required, decontamination is a specific medical countermeasure to toxic or chemical exposures. It should be considered a first aid measure that can be explained to patients as such.

Scene Management

It is critically important to control the environment of a hazardous materials incident. Isolate the scene and deny access to the public, media, and unnecessary responders to prevent needless contamination. Hazardous materials scenes have three concentric control zones:

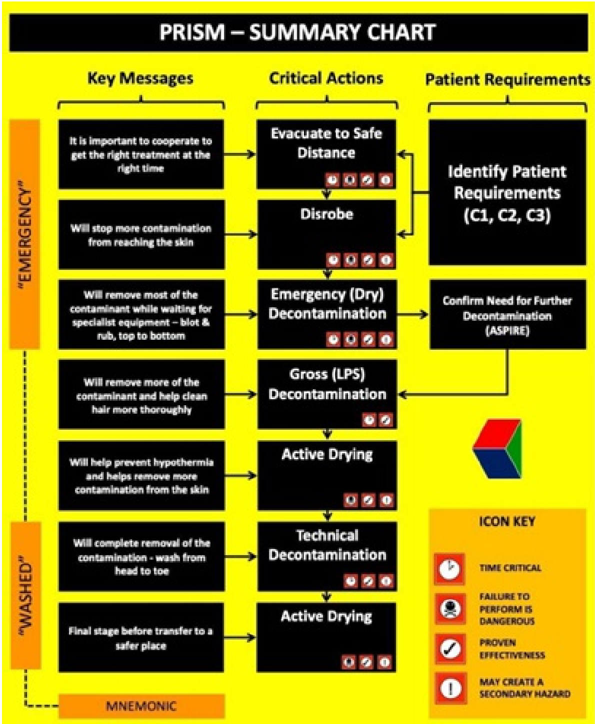
- The **hot zone**, or red zone, is an exclusion or restricted area. Chemical protective equipment is required.
- The **warm zone**, or yellow zone, is an area for decontamination or contamination reduction. Chemical protective equipment is also required here.
- The **cold zone**, or green zone, is a support zone and is the location in which BCEHS will conduct assessment and treatment. No chemical protective equipment is required in this zone.

All paramedics and EMRs must contact CliniCall to speak with paramedic specialists prior to assessing patients from a hazardous materials incident or chemical exposure. BCEHS does not provide equipment to protect against exposures or to work in hot or warm zones.

It is vitally important that BCEHS paramedics and EMRs work collaboratively with other agencies at the scene to manage hazardous materials incidents and perform appropriate decontamination.

Procedure

- Evacuate patients to a safe distance prior to decontaminating. Segregate individuals by gender whenever possible.
- Have patients remove all clothing and jewelry prior to performing an emergency (dry) decontamination: this is the most important step and may remove 80-90% of contaminants.
- When conducting a wet decontamination, wash with water and mild soap. Pay close attention to exposed skin folds, axillae, genitals, and feet. Use warm water to reduce the risk of hypothermia and work systematically from head to toe.
- The optimal water rinse time is 15 minutes per person. In cases with large numbers of contaminated patients, a 3 minute water rinse irrigation is permissible to prevent secondary contamination and downstream contamination of health care providers.
- All removed clothing items are considered hazardous and must be properly collected, double bagged, and marked as such for disposal.
- A majority of patients involved in a chemical exposure will not stay at the scene and may find alternative means of transport to hospitals. Surrounding health care facilities should be notified as soon as possible of potentially contaminated patients self-presenting.



The Three Pillars of the Primary Operational Response (POR)

Adapted from "Decontamination Guidance for Chemical Incidents," at 'medicalcountermeasures.gov'

The overriding objectives of the POR are to maximize initial survivability and minimize long term sequelae in individuals who have been accidentally or deliberately exposed to toxic chemicals. The three "pillars" that support these objectives are an understanding of individual needs (patient requirements), an effective communication/management strategy, and clinically effective patient-focused actions.

Patient Requirements

A proportion of patients may be unable to comply with instructions issued by emergency responders. For example, they may be unresponsive, have life-threatening injuries, or may not be able to understand instructions or perform activities without accommodations or assistance. In order to maintain operational effectiveness, all patients need to be rapidly categorized to ensure they are on the appropriate treatment pathway. This guidance document defines three patient categories (C1, C2, C3).

Definition of Patient Categories:

- C1: Patients who are able to understand instructions and perform activities without assistance.
- C2: Patients who are either unable to understand instructions, or who are unable to perform activities without accommodations or assistance.
- C3: Patients who are unresponsive, have life-threatening injuries, or require extensive accommodations or assistance.

Assistance with this form of triage is available from the ASPIRE tool, available from the National Library of Medicine's CHEMM website.

Communication and Patient Management

Good communication is key to acquiring the trust and cooperation of patients and will maximize the overall efficiency of the initial response phase. Failure to adequately interact with patients may lead to unnecessary anxiety, non-compliance, and security issues at the scene of an incident.

Patient-Focused Action

The goal of the POR is to save lives and improve the clinical outcome of chemically contaminated patients. It is imperative that the following four actions are performed as soon as practically possible:

- Evacuation: Immediate, orderly movement upwind from hazardous areas is a key component of the initial operational response. Inappropriate or delayed evacuation may exacerbate the clinical effects of exposure to hazardous materials and will hamper the effectiveness of subsequent operations.

- Disrobe: The critical, urgent need to safely remove contaminated clothing cannot be overemphasized and is a process that requires effective communication to facilitate patient compliance. The golden rule is that no form of decontamination should be undertaken before disrobing.
- Decontamination: While disrobing will remove the vast majority of a contaminant, exposed areas will require decontamination to remove hazardous material from the hair and skin. There are three forms of decontamination: emergency, gross, and technical.
  1. Emergency decontamination is the phrase used to emphasize the time-critical process for the immediate removal of hair or skin contamination by any available means and can be divided into "dry" and "wet."
     - Emergency dry decontamination is the default option and should be performed with any available absorbent material.
     - Emergency wet decontamination should only be used when the contaminant is caustic (e.g., provokes immediate skin irritation) or is particulate in nature and should be performed using any immediately available source of water at an appropriate temperature (i.e. not exceeding 40º C or 104º F).
  2. Gross decontamination includes the Ladder Pipe System: two fire engines are parked parallel to form a corridor through which patients pass while being sprayed with a high volume of low-pressure water mist. Alternatively, patients can be sprayed directly with hosepipes using a fogging nozzle.
  3. Technical decontamination requires the use of specialist decontamination units and associated resources that need to be transported and subsequently deployed at the scene of an incident. In some jurisdictions, technical decontamination is performed at a hospital and so requires conveyance of patients from the scene of the incident. Either way, there will be a delay before technical decontamination can be performed.

Early emergency and gross decontamination compensates for the delayed availability of technical decontamination. It should be noted that the clinical benefits of emergency, gross, and technical decontamination are synergistic: such a "triple protocol" is most effective when performed as one continuous process.

- Active Drying: The act of drying the skin after any form of wet decontamination is a key step. This simple but effective process assists in the removal of contaminants from the hair and skin surfaces, inhibiting further spread of contamination.

References

1. US Department of Health & Human Services. MedicalCountermeaures.gov. [Link]
2. US Department of Health & Human Services. Patient Decontamination in a Mass Chemical Exposure Incident: National Planning Guidance for Communities. 2014. [Link]
3. US Department of Health & Human Services. PRISM: Primary Response Incident Scene Management. [Link]

PR06: High Performance CPR

Applicable To

FR and higher

Introduction

The 2020 AHA CPR Guidelines emphasized the importance of providing high quality CPR. The quality and timing of CPR is critical to successful resuscitation in patients who have experienced a sudden cardiac arrest. High performance CPR should be used in all cases of cardiac arrest from a presumed cardiac cause (i.e., not in traumatic arrests).

Procedure

- Paramedics and EMRs/FRs should adhere to the five principles of high quality CPR by focusing on providing:
  1. Compressions at optimal rates: 100 to 120 compressions per minute.
     - For patients without an advanced airway (supraglottic airway or endotracheal tube), perform compressions and ventilations at a ratio of 30:2.
     - For patients with an advanced airway in place, perform continuous chest compressions, ventilating every 6 seconds.
  2. Compressions at an optimal depth of 5 centimetres (2 inches).
  3. Complete chest recoil during compressions: after each compression, a negative pressure develops in the chest that pulls blood into the thorax for the next compression. (This is also when coronary arteries are perfused.) Maintaining pressure on the chest wall that results in incomplete chest recoil diminishes or prevents the return of blood into the thorax.
  4. When providing ventilations, be aware of appropriate volumes; in adult patients, no more than 500-600 mL should be given during CPR.
  5. Minimally interrupted compressions. Pauses during compressions should be limited to 10 seconds or less. Perform pulse checks only while analyzing rhythms, or if signs of spontaneous circulation become evident.
- When charging monitors and defibrillators prior to delivering shocks:
  1. For AEDs: pause compressions only as long as required to conduct the analysis. Immediately resume compressions once the AED has completed the analysis, even if a shockable rhythm is detected.
  2. With compressions ongoing, verify the presence of a central pulse.
  3. Charge the defibrillator (or allow the AED to charge).
  4. Once the defibrillator is charged, stop compressions. Confirm the absence of central pulses.
  5. Clear the patient and deliver the shock.
  6. Immediately resume compressions *without* checking for pulses.
- Clear delegation of roles and effective intra-team communication and leadership are fundamental to success in resuscitation efforts.

References

American Heart Association. 2020 American Heart Association Guidelines for CPR and ECC. 2020. [Link]

PR07: Nasopharyngeal Airway

Applicable To

EMR and higher

Introduction

Nasopharyngeal airways can provide significant airway protection for patients whose level of consciousness is decreased, but who maintain some airway reflexes and for whom oropharyngeal airways would prompt gagging or vomiting. They are also useful for patients who exhibit trismus or have injuries to the mouth or jaw.

Indications

- Patients who require an airway adjunct but who are unable to tolerate an oropharyngeal airway, or where an oropharyngeal airway is unable to be placed

Contraindications

- Significant maxillofacial trauma, particularly Le Fort fractures that include the zygoma(s)

Procedure

1. Select an appropriate size of nasopharyngeal airway by measuring a candidate airway against the patient's face: measure the distance from the nostril to the tragus of the ear, holding the nasopharyngeal airway in its neutral position. Do not straighten the airway to measure it.
2. Lubricate the barrel of the nasopharyngeal airway. Avoid getting lubricant in the lumen.
3. Unless anatomy or injury dictates otherwise, select the largest nostril on the patient and insert the nasopharyngeal airway perpendicularly to the plane of the face. Advance the airway straight back with a gentle but firm motion. Some rotation may be necessary to overcome obstacles in the turbinate. Do not use force to overcome resistance.
4. A jaw thrust is needed to ensure the epiglottis lifts off the laryngeal inlet.

Notes

- Epistaxis is the most common complication of nasopharyngeal airway placement. This risk is higher in individuals who are taking anticoagulant medications. If bleeding develops, leave the nasopharyngeal airway in place so long as it does not cause airway obstruction or compromise; otherwise, remove the airway and place the patient in a protective position.
- PCPs may not suction down the lumen of the nasopharyngeal airway.

Resources

PR08: Supraglottic Airway

Applicable To

- PCP and higher
- PCP requires completion of AIME BLS II **and** CPD 2019, or its equivalent (NEO post-February 2019), or PPEd sign-off for use outside of cardiac arrest

Introduction

This procedure reference contains changes related to COVID-19.

The iGel supraglottic airway device is a tool used to provide a higher degree of airway protection that can be obtained through the use of a pharyngeal airway. It transfers the working interface between the bag-valve mask from the face to the laryngeal inlet. Paramedics may use supraglottic devices in the setting of cardiac arrest or in patients who are obtunded and breathing spontaneously.

When preparing for SGA insertion, a pre-connected viral filter must be used.

Reversion to bag-valve mask ventilation with a tight seal and viral filter should be used if SGA placement fails.

Indications

- Patients who are unable to protect their airways due to a decreased level of consciousness
- PCPs who have not completed AIME BLS II and CPD 2019 (NEO completed February 2019 or later is considered equivalent) may only use supraglottic airway devices in cardiac arrest

Contraindications

- Inability to place device due to difficulties with mouth opening
- Known or suspected pathological or foreign-body airway obstruction, including epiglottitis
- Trauma to the trachea, neck, or oropharynx
- Caustic ingestion
- Active vomiting
- Relative: Anticipated requirement for high inspiratory pressures during ventilation

Procedure

1. Select an appropriately-sized supraglottic airway and remove it from its packaging and cradle. EGD sizing is based on patient weight.
2. Place lubricant on the cradle. Lubricate the supraglottic airway on all sides, taking care to avoid the lumen.
3. Open the patient's mouth and introduce the soft tip towards the hard palette.
4. Allow the supraglottic airway to glide along the hard palette and advance the device until resistance is felt.
5. Confirm placement by ventilating with a bag-valve mask.
6. Secure the supraglottic airway using the included tube holder. Do not use Thomas tube holders for this purpose as they are not designed to accommodate a supraglottic airway.

If it becomes necessary to remove a supraglottic device:

1. Where possible, raise the patient to a semi-recumbent position (30°).
2. Prepare suction, bag-valve mask, and oxygen delivery devices.
3. Cut or remove ties or tube holders.
4. Ask the patient to take a deep breath, then blow out firmly. While the patient is blowing out, pull the airway smoothly out of the mouth.
5. Suction the oropharynx as needed.
6. Monitor oxygen saturation.

7. Support respirations as needed.

Notes

- Airway obstructions are an absolute contraindication to the use of a supraglottic airway. Paramedics **must**, therefore, confirm they are able to ventilate the patient with a bag-valve mask prior to placing a supraglottic airway.
- The supraglottic airway is a tool to solve problems relating to oxygenation and ventilation. Paramedics should apply a staged approach to airway problem solving prior to using a supraglottic airway.
- PCPs are permitted to use a modified approach to the in-built suction port available on all iGel SGAs to provide pharyngeal suction during cardiac arrest.
- Do not occlude the suction port of the supraglottic airway.

Changelog

- 2023-01-04: changed references to devices used to secure SGA

Resources

PR09: Continuous Positive Airway Pressure

Mike Sugimoto

Applicable To

PCP with AIME CPAP training and higher

ClinicCall consultation recommended for PCPs prior to use of continuous positive airway pressure

Introduction

Continuous positive airway pressure (CPAP) devices provide a non-invasive method of improving oxygenation in patients who are experiencing significant respiratory distress. The use of CPAP eases work of breathing, supports alveolar recruitment, decreases overall mortality, and reduces the need for intubation.

Indications

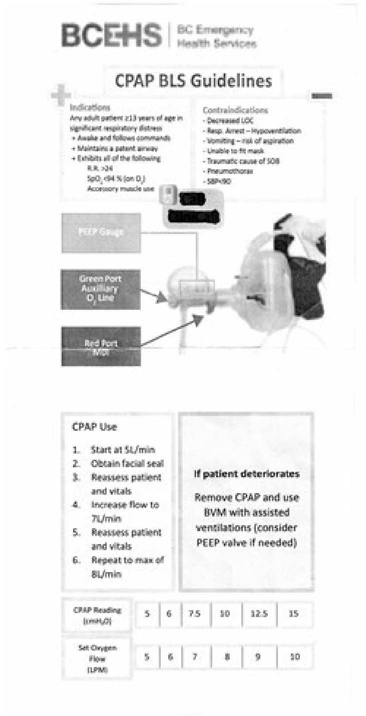
Patients who are:

- Awake and able to follow commands
- Able to maintain an open airway
- Age 13 years of age and up
- Exhibiting respiratory distress with **all** of the following:
  - Respiratory rate > 24/minute
  - SpO2 < 94% on supplemental oxygen
  - Use of accessory muscles
- Consider the use of CPAP in adult patients with respiratory distress, including but not limited to:
  - Congestive heart failure or acute cardiogenic pulmonary edema
  - Asthma
  - Submersion injuries
  - Pneumonia
  - Chronic obstructive pulmonary disease

Contraindications

- Patient age 12 years and less
- Decreased level of consciousness, or inability to follow commands
- Respiratory arrest or hypoventilation
  - Patients who are in imminent or actual respiratory failure (i.e., whose respirations are slow, feature shallow tidal volumes, and whose level of consciousness is falling) are not candidates for CPAP; these patients *must* be ventilated with a bag-valve mask (and may benefit from PEEP use)
- Unable to fit mask to patient's face
- Vomiting or any other risk of aspiration
- Traumatic cause of respiratory distress
- Tracheostomy
- Suspected or known pneumothorax
- Systolic blood pressure < 90 mmHg

Procedure



BCEHS | BC Emergency Health Services

CPAP BLS Guidelines

Indications
Any adult patient ≥13 years of age in significant respiratory distress
+ Awake and follows commands
+ Maintains a patent airway
+ Exhibits all of the following
R.R. >24
SpO_2 <94 % (on O_2)
Accessory muscle use

Contraindications
- Decreased LOC
- Resp. Arrest – Hypoventilation
- Vomiting – risk of aspiration
- Unable to fit mask
- Traumatic cause of SOB
- Pneumothorax
- SBP<90

PEEP Gauge

Green Port Auxilliary O_2 Line

Red Port MDI

CPAP Use

1. Start at 5L/min
2. Obtain facial seal
3. Reassess patient and vitals
4. Increase flow to 7L/min
5. Reassess patient and vitals
6. Repeat to max of 8L/min

If patient deteriorates

Remove CPAP and use BVM with assisted ventilations (consider PEEP valve if needed)

CPAP Reading (cmH_2O)	5	6	7.5	10	12.5	15
Set Oxygen Flow (LPM)	5	6	7	8	9	10

ClinCall consultation recommended for PCPs prior to initiating CPAP therapy.

1. Assemble appropriate equipment. Verify mask sizing by comparing the mask to the patient's face.
2. Explain the procedure and obtain consent.
3. Position the patient in an upright, sitting position. Attach pulse oximeter.
4. Connect the CPAP mask to the oxygen source. Set the flow to 5 LPM if possible (otherwise use 6 LPM).
5. Have the patient hold the CPAP mask over their nose and mouth. A progressive application of pressure to obtain a seal may be required to maximize the acceptance of the mask. Paramedics should be calm and reassuring.
6. Once the patient appears to be able to tolerate the mask, position the bonnet over the back of the head and attach the straps to the side of the mask. Adjust the Velcro and headpiece for optimal seal.
7. Examine the mask seal for leaks. Reassess the patient.
8. If SpO_2 remains below 92%, follow the manufacturer's flow rate chart. Incrementally raise the oxygen flow to increase both FiO_2 and CPAP pressure. Do not exceed 10 cmH_2O.

Notes

- Do not attempt to use the CPAP mask for bag-valve ventilations.
- Oxygen saturations may transiently fall during initial CPAP use. Allow time for the mask to work before adjusting the therapy.
- Do not delay the administration of medications to apply a CPAP mask.
- Use conventional therapies (e.g., bronchodilators) first in patients with audible wheezing. Nebulizers, connected to the mask with a T-piece, may be attached to the auxiliary port on the CPAP mask; in this case, increase the oxygen flow rate by 7-8 LPM.
- A do-not-resuscitate order or MOST does not preclude the use of CPAP for relief from shortness of breath.

Resources

References

1. BLS Systems. Rescuer II Compact CPAP System. [Link]

PR10: Positive End Expiratory Pressure (PEEP)

Mike Sugimoto

Applicable To

PCP and higher

Introduction

The addition of a Positive End-Expiratory Pressure (PEEP) valve to a bag-valve mask is a non-invasive means of increasing oxygenation in patients who are in significant respiratory distress or respiratory arrest where assisted ventilations are not able to maintain oxygen saturation. It maintains air pressure in the alveoli, "splinting" them open to increase the surface area involved in gas exchange.

Indications

- Patients who remain hypoxemic (SpO_2 < 90%) despite good bag-valve mask ventilation techniques and airway management; it can be combined with high-flow nasal cannula oxygenation to maximize oxygen delivery

Contraindications

- Patients in cardiac arrest
- Patients over 12 years of age: Systolic blood pressure ≤ 90 mmHg
- Patients under 12 years of age: Systolic blood pressure ≤ lower limit for age range as per pediatric vital signs
- Known or suspected pneumothorax
- Traumatic cause of respiratory arrest

Procedure

1. Attach the PEEP valve to the exhaust port on the bag-valve mask.
2. Set the dial on the PEEP valve to 5 cmH_2O.
3. Establish and maintain a good mask seal. Begin ventilating at an appropriate rate, usually no more than 8-10 breaths per minute.
4. Monitor oxygen saturation and blood pressure for changes.
5. PEEP may be increased in increments of 2.5 cmH_2O to a maximum of 10 cmH_2O.
    - ClinCall consultation required if patients remain hypoxemic despite maximal oxygen therapy.
6. Continue with medications as appropriate to correct cause of respiratory distress or arrest.

Notes

- To be effective, PEEP requires a complete mask seal (the "closed circuit"). Removing the mask from the patient's face will release the end-expiratory pressure and allow alveoli to collapse. For critically ill patients, paramedics should seek to minimize the amount of time the mask is not firmly sealed to the patient's face.
- Discontinue PEEP if any of the following occur:
    - The patient's systolic blood pressure drops below 90 mmHg
    - Any contraindication arises
    - Equipment failure or concerns

PR11: Intranasal Medication Administration

Mike Sugimoto

Applicable To

PCP and higher

Introduction

Some medications in the BCEHS pharmacopeia can be administered intranasally. This is a relatively rapid route of delivery that can offer significant safety benefits over parenteral drug administration and may be preferred in some circumstances.

Procedure

1. Using a blunt 3 mL syringe, draw up half the dose of medication. Note that the atomizer contains 0.1 mL of dead space: having calculated the volume of medication required for a given dose, draw an additional 0.1 mL into the syringe.
2. Remove the blunt or fill tip and attach the mucosal atomizer device to the syringe.
3. Verify that the nostrils are not obstructed by blood or mucous.
4. If the patient is sitting upright, tilt the patient's head back slightly. Otherwise, position the patient supine.
5. Dispense the volume into each nostril; this allows for more effective absorption. The maximum volume per nostril is 1 mL; if higher volumes are required, consider alternative routes of administration.
6. Repeat procedures 1-5 for the second half of the medication dose. (Drawing up half the dose of medication and administering twice ensures that the medication is delivered at the appropriate speed for proper atomization.)

Resources

PR12: Intraosseous Cannulation

Mike Sugimoto

Applicable To

□□ PCP: requires completion of scope expansion education

ACP and higher

Introduction

Intraosseous cannulation is available as an option for paramedics requiring vascular access when peripheral attempts have failed.

Indications

- Two unsuccessful peripheral IV attempts or an inability to visualize peripheral veins (including external jugular vein)
- Unstable patient requiring medications or fluid replacement
- □□ **Requires completion of PCP scope expansion education:**
  - The tibial site is the only site approved for PCP use. PCPs are limited to two collective attempts per patient only. Do not attempt to re-cannulate a site that has failed or been dislodged.
  - IOs **may** be placed under **direct** supervision by ACPs or higher. The ACP (or higher) remains responsible for any anesthesia or pain management requirements.
  - PCPs may place intraosseous devices in patients **in cardiac arrest** where there is a **clear clinical history of intravascular volume depletion from a non-traumatic source**, where fluid administration is a critical component of the resuscitation plan. CliniCall must be consulted prior to placement of an intraosseous device.
  - Intraosseous placement must **not** delay or impair the delivery of high-quality CPR, effective airway management, or defibrillation. Placement should be deferred until at least three rounds of chest compressions, with AED analyses, have been completed.

Contraindications

- Skeletal or tissue damage in the extremity to be used
- Prior proximal tibial surgery or knee joint replacement
- Signs of infection around the site

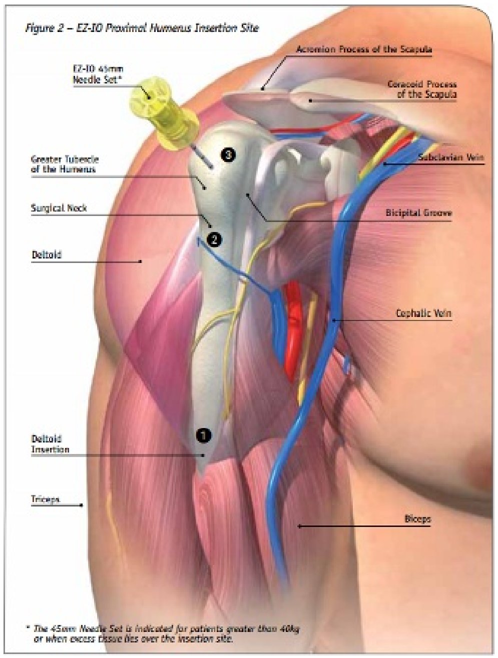
Procedure

1. Assemble equipment, including EZ-IO driver, needle, primed EZ-Connect extension, infusion fluid and line set, and 20 mL syringe of normal saline.
2. Select the site of needle insertion and clean the skin.
3. Using aseptic techniques, drive the needle into the bone. Press gently: let the drill do most of the work.
4. Remove the stylet and securely discard the sharp. Place the stabilizer dressing over the needle hub.
5. Connect a primed EZ-Connect extension. **(ACP ONLY:** In patients who are conscious, prime the EZ-Connect extension with lidocaine - see step 7).
6. Aspirate for the presence of bone marrow or blood to confirm the placement. If patent, connect the IV tubing to the EZ-Connect extension set. If unsuccessful, change to another site on a different limb. Do not reuse the same limb.
7. **ACP ONLY:** In patients who are conscious, administer lidocaine, 40 mg (0.5 mg/kg in children to a maximum of 40 mg)
   - Instill the lidocaine slowly, over 120 seconds, making sure to flush the appropriate amount of lidocaine through the extension, and allow it to dwell in the bone marrow cavity for 60 seconds.
   - Slowly flush the IO catheter with 5-10 mL normal saline (2-5 mL in children) following the administration of lidocaine.
8. Connect the 20 mL syringe to the proximal access port on the IV tubing. Flush the line and the extension set, pushing *firmly* and *briskly* on the syringe plunger.

9. Set the appropriate flow rate. Pressure infusers or intermittent boluses may be required.
10. Protect the site and monitor for signs of extravasation.

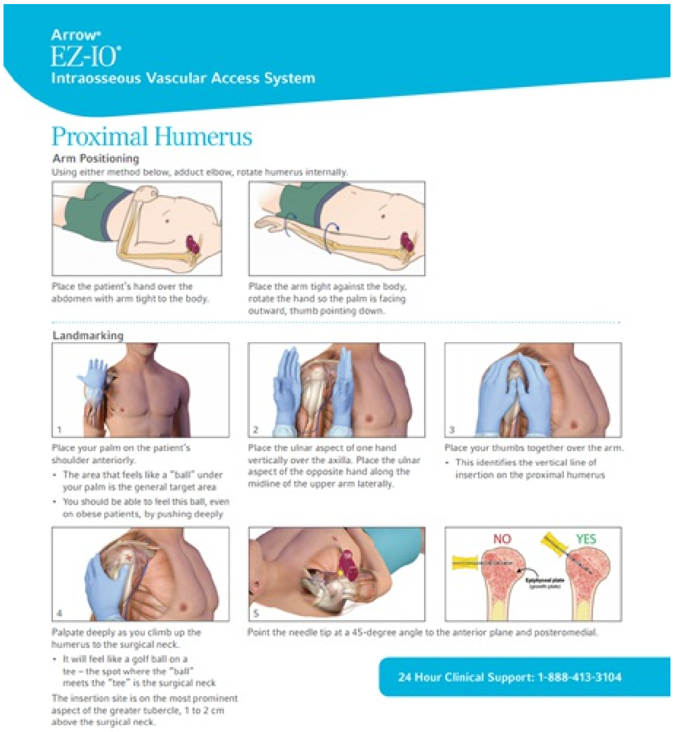
Notes

- Needle placement in the proximal humerus has been demonstrated to have significantly improved infusion rates compared to the tibial plateau. It should be considered as the preferred IO site in patients **under ACP care**. If using the humerus, choose the larger (yellow) needle. To review anatomy and landmarks, see video below.



- Paramedics should review this educational material for additional information about intraosseous site selection. Contact a Paramedic Practice Educator for specific questions or concerns.
- Intraosseous catheters are approved for use in patients for up to 24 hours when placed in the proximal humerus and both the proximal and distal tibia. It may be extended for up to 48 hours in patients over the age of 12 under exceptional circumstances.

Resources



Tibial placement:

Humeral landmarking:

References

- 2023-09-29: added PCP scope information

PR13: External Jugular Cannulation

Mike Sugimoto

Applicable To

ACP and higher

Introduction

External jugular cannulation is a vascular access option that allows for relatively large bore devices and the delivery of larger volumes of fluid than might otherwise be possible through a peripheral vein.

Indications

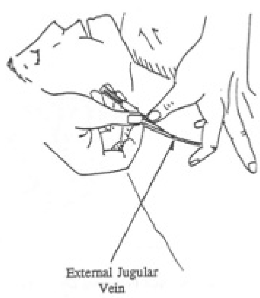
- A need for vascular access where peripheral access is not possible and intraosseous access is unavailable

Contraindications

- No absolute contraindications. This can be a time-consuming procedure; if speed is a requirement, consider PR12: Intraosseous Cannulation.

Procedure

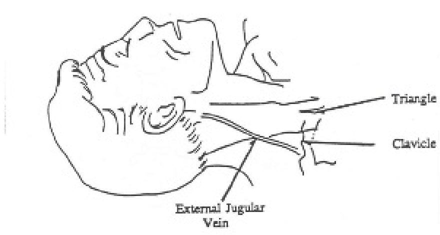
1. Place the patient in a supine, head-down position to fill the jugular vein. Turn the patient's head to the opposite side (i.e., looking away from the proposed cannulation site).
2. Clean the skin with alcohol.
3. Align the cannula with the vein and the point of the needle aimed at the shoulder on the same side.
4. While applying pressure to the vein above the clavicle to provide a tourniquet effect, make the venipuncture midway between the angle of the jaw and the clavicle.



Notes

Anatomy

The external jugular vein is formed below the ear and behind the angle of the mandible, where a branch of the posterior facial vein joins the posterior auricular vein. The external jugular vein then passes downward, and obliquely backward, across the surface of the sternomastoid muscle before piercing the deep fascia of the neck just above the middle of the clavicle, ending in the subclavian vein lateral to the anterior scalene muscle. Valves are present in this vein at the entrance to the subclavian vein and about four centimeters above the clavicle.


Triangle
Clavicle
External Jugular
Vein

PR14: Orogastric Tube Placement

Mike Sugimoto

Applicable To

ACP and higher

Introduction

High volumes of air or fluid in the stomach can significantly affect a patient's ability to be ventilated by bag-valve mask and limit the effectiveness of chest compressions by inhibiting the return of venous blood to the thorax. In these cases, the stomach should be decompressed by placement of an orogastric tube.

Indications

- Cardiac arrest
- Gastric distension interfering with effective ventilations

Contraindications

- Use extreme caution if there is a history of caustic ingestion or esophageal varices

Procedure

1. Assemble and prepare equipment:
    - Gastric tube (14 Fr or 16 Fr)
    - Water soluble lubricating gel
    - Laryngoscope
    - 30–60 mL catheter-tip syringe (not Luer lock)
    - Stethoscope
    - Personal protective equipment, including gloves and face shield
    - Suction tubing
    - Tape
2. Estimate the length of tube required: measure the distance from the epigastrium to the corner of the mouth or nose, passing by the earlobe.
3. Using aseptic technique, lubricate the distal 7.5 to 10 cm of the tube.
4. Visualize the esophagus using a laryngoscope.
5. Insert the tube and advance to the desired depth.
6. Check tube placement by auscultating over the epigastrium while injecting 20-30 mL of air down the tube. Bubbling or "whooshing" sounds should be heard. If sounds are not heard, advance the tube by another 2.5-5 cm and re-check.
7. Once tube placement has been confirmed, secure the tube with tape. Connect to suction at low vacuum.

PR15: Tracheal Tube Introducer

Mike Sugimoto

Applicable To

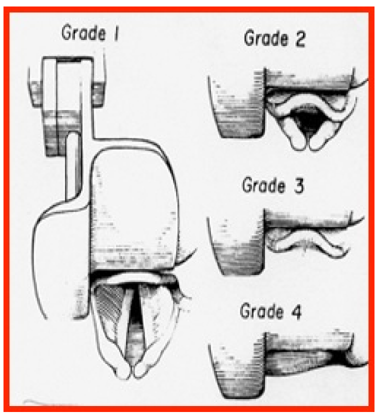
- ACP and higher

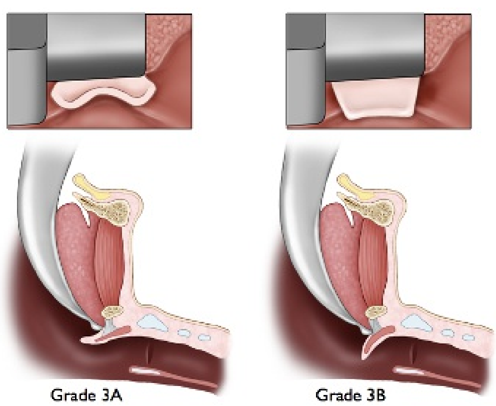
Introduction

The tracheal tube introducer (bougie) is a tool to assist with the placement of an endotracheal tube into the trachea in cases where an optimal view cannot be obtained on direct laryngoscopy after lifting the head, performing extralaryngeal manipulation, or both.

Indications

Although bougies may be used in virtually all scenarios, they are intended primarily for patients who demonstrate a Grade 3A Cormack-Lehane view on laryngoscopy: the epiglottis is upturned and the arytenoid cartilages may or may not be visible. They can also be helpful in patients with Grade 2 views to assist in tube placement.





Contraindications

Patients with Grade 3B or 4 views; paramedics should not “fish” with the bougie in search for the glottic opening and the trachea.

Procedure

1. Introduce the coudé tip of the bougie from the right corner of the patient’s mouth.
2. Advance the bougie towards the midline, beneath the epiglottis, while attempting to keep the distal tip in contact with the

posterior surface of the epiglottis.

3. A slight "pop" or distinct tactile change may be felt when the bougie passes through the glottic opening. Two separate tactile phenomena will allow paramedics to confirm the bougie is in the trachea rather than the esophagus:
   - Once the bougie has passed through the vocal cords, a fine "clicking" sensation may be felt as the bougie tip rubs against the cartilage rings in the trachea. (Some operators describe this as a "sandpaper" feeling of the bougie.)
   - With continued advancement, the bougie will eventually "hang up" in a smaller distal airway. In most patients, this will occur around the 30 cm mark. If the bougie can be advanced further than 30 or 35 cm, it is very likely in the esophagus. Once "hold up" has been achieved, the bougie should be withdrawn to around the 25 cm mark (i.e., out of the smaller distal airways and bronchi and back into the trachea).
4. The endotracheal tube can be advanced over the bougie and into the trachea. Hold the laryngoscope in position during this process; do not remove the blade until the cuff on the endotracheal tube is inflated. Continued laryngoscopy will help the endotracheal tube to advance into the trachea.
5. Common problems with bougie use include:
   - Failure to access the trachea. This is often the result of the bougie becoming caught on a vocal fold. To resolve, rotate the bougie to the left or right while maintaining forward pressure.
   - Failure to advance the endotracheal tube. This is often caused by the bevel of the endotracheal tube catching on the right vocal fold. Hold the laryngoscope in position and rotate the tube counter-clockwise by 90°; this will direct the bevel away from the right fold and allow smoother passage. If this fails to allow the tube to advance, consider a smaller tube size.

Resources

References

1. Kovacs G, et al. Airway Management in Emergencies. Second Edition. 2011.
2. Levitan R. Tips for Handling the Bougie Airway Management Device. 2014. [Link]
3. The Resus Room. Why I Use a Bougie on Every Airway. 2017. [Link]

PR16: 12-Lead ECG Acquisition

Applicable To

- PCP as trained and authorized, or under direction
- PCPs require completion of online and face-to-face training **and** endorsement from EMALB
- ACP and higher

Introduction

The 12-lead electrocardiogram is one of the most useful diagnostic tests in medicine and is a critical component in out-of-hospital care and decision-making. It allows paramedics to view the rhythm of the heart and provides important information about the state of blood flow to various regions of the heart.

Indications

- Suspicion of cardiac ischemia or rhythm disturbance

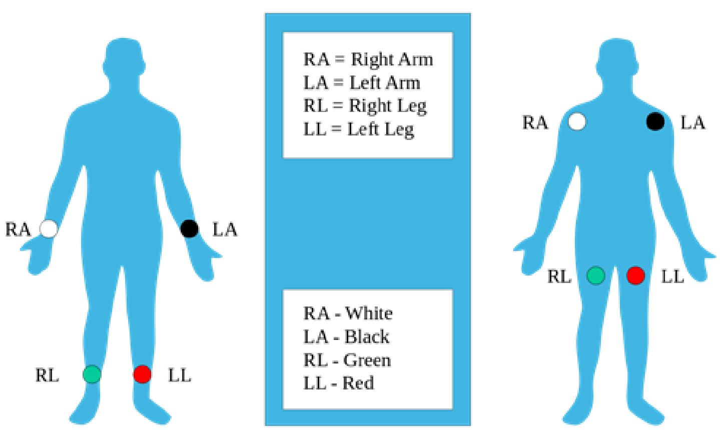
Contraindications

- As a diagnostic procedure, there are few absolute contraindications to 12-lead ECG acquisition; paramedics must ensure that the time needed to acquire a 12-lead ECG does not interfere with priority patient management tasks

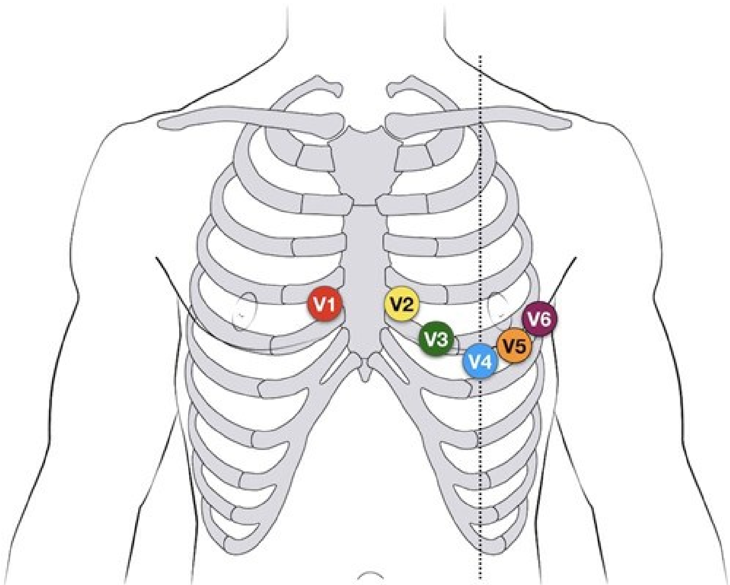
Procedure

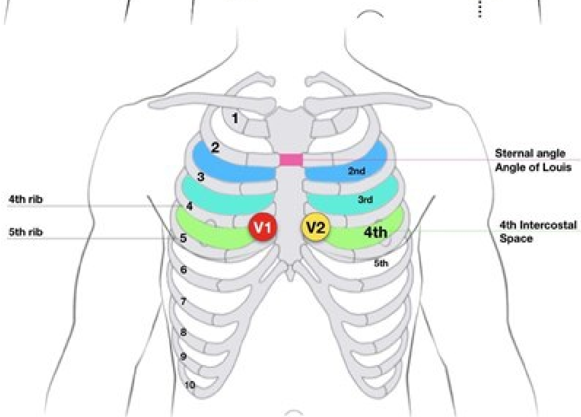
Procedure: Standard 12-Lead ECG

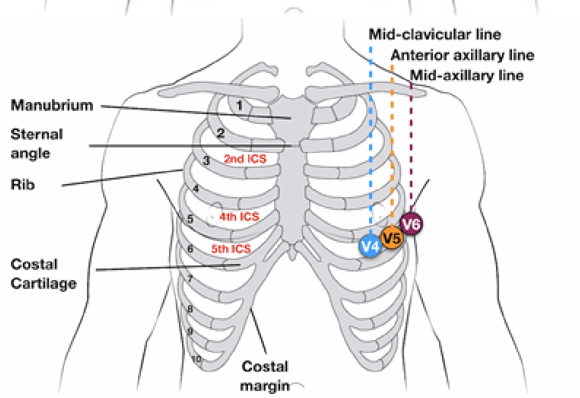
1. Assemble required equipment. Connect electrodes to lead wires before placing them on the patient and connect the cables to the monitor. Ensure cables are not tangled.
2. Prepare the patient's skin as discussed below in 'Notes.'
3. Place the limb leads in the appropriate locations. RA and LA leads can be placed on the deltoids or wrists. RL and LL should be placed near the ankles (or alternatively, on the lower left leg). In all cases, ensure the leads are not positioned over bone.



4. Landmark and place the precordial leads in their appropriate locations. Find the clavicle and identify the Angle of Louis as illustrated.







- V1 is located at the fourth intercostal space on the right of the sternum.
- V2 is also at the fourth intercostal space, but on the left side of the sternum.
- V3 is located between V2 and V4. For ease of placement, inexperienced operators should place V3 *after* V4 has been positioned.
- V4 is placed at the fifth intercostal space on the mid-clavicular line. Generally, this will be inferior to the left nipple.
- V5 is also at the fifth intercostal space, but on the anterior axillary line.
- V6 is level with V5 on the mid-axillary line.

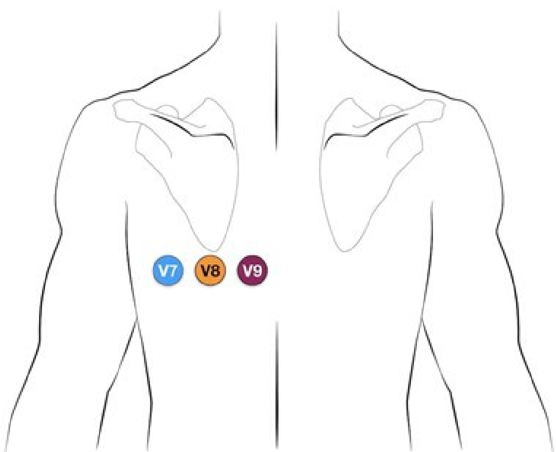
5. Ask the patient to remain still, relax their body, not talk, and to breathe calmly. Press the "12 Lead" button on the LifePak 15. The monitor will prompt for an age and gender. Use the scroll wheel to enter the requested information and push the wheel to confirm each entry. (This information is critical for the machine interpretation algorithm and can also affect the processing of ECG signals by the LifePak 15. Paramedics must make every effort to enter this information accurately.)

6. The monitor will attempt to acquire the ECG. If '**NOISY DATA – PRESS 12 LEAD TO ACCEPT**' appears, attempt to identify the source of the problem (e.g., loose electrode contact, patient movement, tension on the lead wires, etc.) and correct the issue. The LifePak 15 will abandon the ECG recording if the noisy data persists for more than 30 seconds ('**EXCESSIVE NOISE – 12 LEAD CANCELLED**'); in this case, restart the acquisition process by pressing "12 Lead" again. If the noise persists, the LifePak 15 can be forced to acquire an ECG at the discretion of the ACP – press the "12 Lead" button when prompted to override.
7. If the ECG is to be transmitted, press the "Options" button and select "Patient" from the menu. The patient's name, PHN, or date of birth (in the "Patient ID" field), and the onset of pain (in the "Incident ID" field), can then be entered using the scroll wheel. The inclusion of this information is very important to minimize delays on arrival at hospital.
8. To transmit the ECG, press the "Transmit" button. Select the desired ECG record and destination site, then select "Send" from the menu.
9. ECGs may be re-printed by pressing "Options," selecting "Print," and then choosing the appropriate record.

Procedure: Posterior Leads

In some cases, a view of the posterior heart is needed, particularly in patients with marked precordial ST depression.

1. Acquire a standard 12-lead ECG.
2. Disconnect V4, V5, and V6 from their traditional placements.
3. Using new electrodes, with the patient leaning forward:

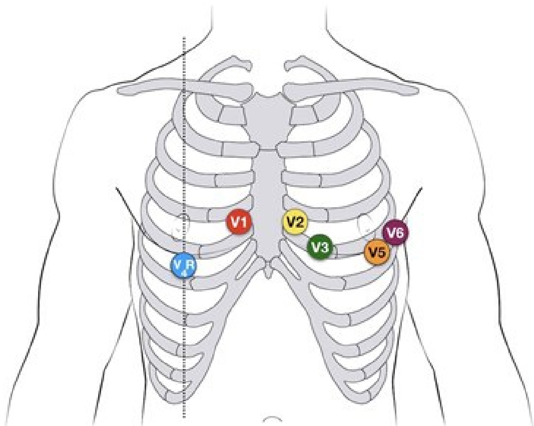


   - Place the V4 electrode on the left posterior axillary line in the same plane as V6. This electrode becomes V7.
   - Place the V5 electrode at the tip of the left scapula, in the same horizontal plane as V6. This electrode becomes V8.
   - Place the V6 in the left paraspinal region, in the same plane as the other electrodes. This electrode becomes V9.
4. Acquire the ECG.
5. Once the LifePak 15 prints the ECG, mark V4, V5, and V6 with their new designations of V7, V8, and V9 on the rhythm strip.

Procedure: Right-Sided Leads

The right-sided chest lead is very helpful in diagnosing right ventricular infarctions.

1. Acquire a standard 12-lead ECG.
2. Disconnect V4 from its traditional placement.
3. Using a new electrode, place V4 at the fifth intercostal space on the mid-clavicular line. This becomes V4R and is essentially the "mirror image" of V4 on the left chest.



4. Acquire the ECG.
5. Once the ECG is printed, mark V4 as V4R on the rhythm strip.

Procedure: Lewis Leads

The Lewis Lead ECG is used in order to have a specific and detailed view of atrial activity. This may be clinically useful when atrial flutter is suspected but not clearly demonstrated, or to detect P waves in a wide complex tachycardia.

1. To create the Lewis Lead, move the right arm electrode to the 2nd intercostal space, right of the sternum. Move the left arm electrode to the 4th intercostal space, right of the sternum (traditionally the landmark for V1).
2. Leave the lower limb leads in place.
3. To read the Lewis Lead, print rhythm strip in 'Lead I'.

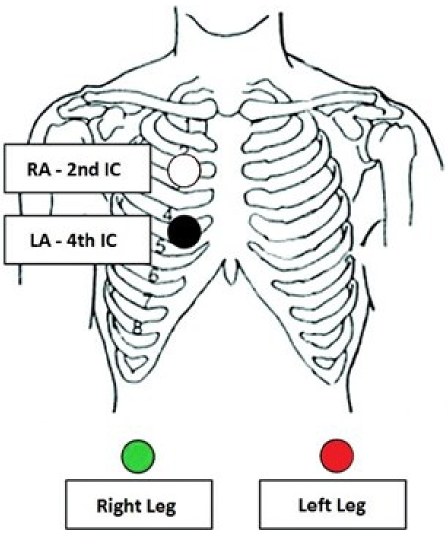


Image Credit: [Life in the Fast Lane ECG Library]

Notes

- 12-lead ECG acquisition is a relatively intimate procedure. Paramedics should strive to preserve patient dignity whenever possible by using gowns or towels.
- Tips for improved ECG quality:
  - Skin preparation can significantly improve the quality of the ECG signal. Shave hair at the site of electrode placement whenever possible. An alcohol wipe can be used to help dry the skin when it is sweaty and a gauze pad can be used to rub the skin briskly to remove sweat, oil, and dead skin cells, improving contact.
  - The conduction of ECG electrodes is improved as they warm. Consider ensuring that electrodes are stored at room temperature (up to body temperature is ideal).

  - Do not press on the center of the electrode while applying it to the patient. Press around the circumference of the electrode to ensure proper adhesion.
- Patients should be supine or semi-recumbent during ECG acquisition. Their limbs should be fully supported.
- The Angle of Louis can be identified by placing a finger in the notch at the top of the sternum. Move the finger downward until a slight ridge or bump is felt, then slide the finger laterally to the patient's right side to locate the second rib and the second intercostal space immediately below. Count down two more intercostal spaces; this is the fourth intercostal space and V1 is placed immediately adjacent to the sternum.
- V4 may be placed under the breast if necessary.
- In patients who have been resuscitated from cardiac arrest, wait at least ten minutes following sustained return of spontaneous circulation before attempting to record a 12-lead ECG.

References

1. BCEHS STEMI Program Manual (link forthcoming)
2. Life in the FastLane. ECG Lead Positioning Basics. [Link]

Wolff-Parkinson-White (WPW) Syndrome

Definition

Pre-excitation disorder of the cardiac conduction system, predisposing one to re-entrant tachyarrhythmias.

History and Physical Exam

Often asymptomatic, but may have history suggestive of tachyarrhythmias: palpitations, chest pain, SOB, dizziness and/or syncope.

Key 12-Lead Features

Short PR interval and characteristic Delta wave.

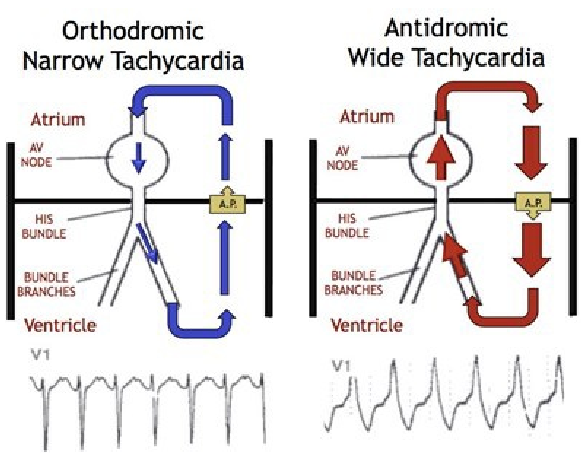
During captured AVRT episodes: orthodromic WPW is a Narrow Complex Tachycardia and looks like an SVT; antidromic WPW is a Wide Complex Tachycardia and looks like VT.

Key Treatment Points

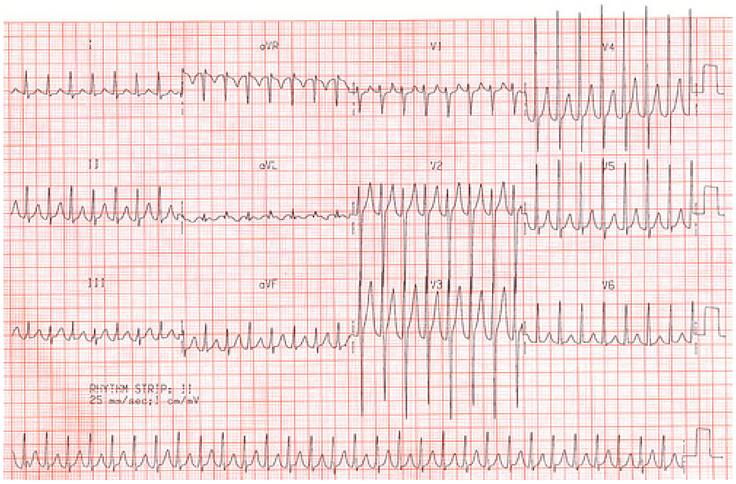
No adenosine with concurrent Atrial-Fibrillation (or any irregular rhythm)

If unstable, proceed directly to electrical cardioversion

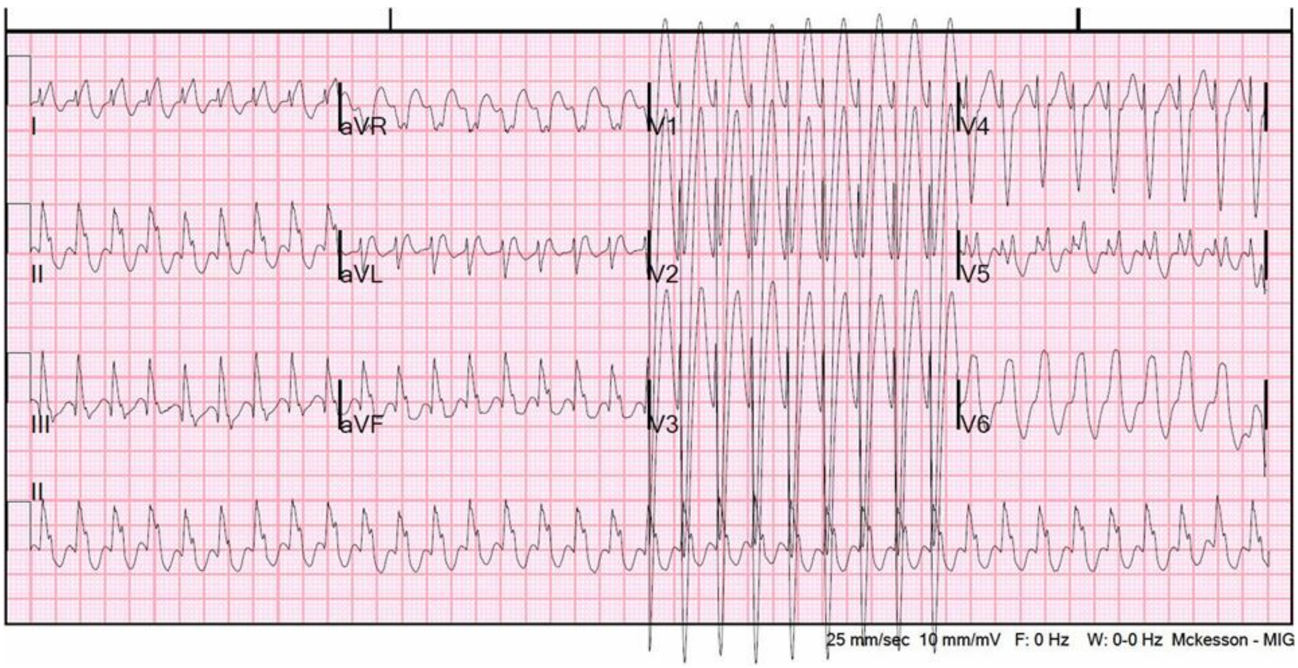
12 Lead ECG Samples



Orthodromic WPW tachycardia episode



Antidromic WPW tachycardia episode



Delta Wave

Further Reading

Reference

1. Stroobandt RX, et al. ECG from Basics to Essentials: Step by Step. 2015. [Link]

Pulmonary Embolism

Definition

A sudden blockage in an artery of the lung.

Wells Criteria for Suspected PE

Criterion	Points
Clinically suspected DVT (pain with palpation, unilateral edema, varicose veins)	3.0
PE Diagnosis is as likely or more likely than another differential	3.0
Tachycardia (HR > 100/min)	1.5
Immobilization/Surgery (in last 4 weeks)	1.5
Previous DVT/PE	1.5
Hemoptysis	1.0
Malignancy (treated within last 6 months)	1.0

Score	Risk	Probability of PE	% of Patients with this Score
> 6	High	66.7%	7%
3-6	Moderate	20.5%	53%
0-2	Low	3.6%	40%

Key 12-Lead Features

Sinus tachycardia (73% sensitivity)

Prominent S-wave in Lead I (73%)

"Clockwise rotation" / late precordial transition (56%)

T-wave inversion in 2+ precordial leads (50%)

Incomplete or complete RBBB (20-68%)

P-pulmonale (28-33%)

Right axis deviation (23-30%)

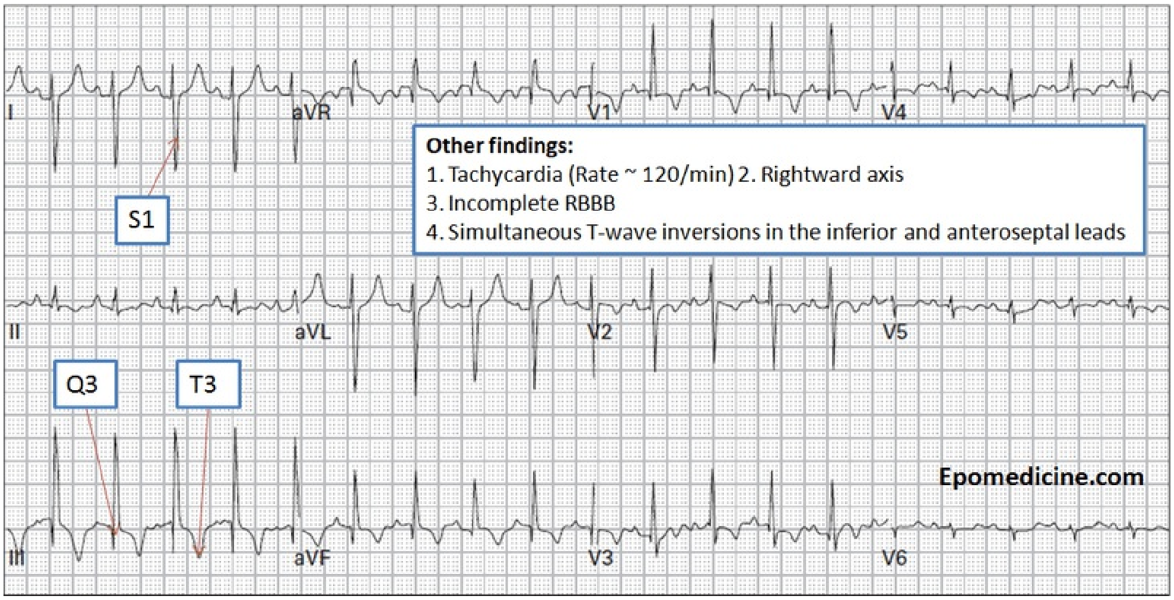
No significant findings (20-24%)

S1Q3T3 (12-25%) (pressure overload of the right ventricle)

Key Treatment Points

Rapid conveyance to hospital, including in cardiac arrest

12 Lead ECG Samples



Further Reading

Reference

Stein PD, Woodard PK, Weg JG, Wakefield TW, Tapson VF, Sostman HD, Sos TA, Quinn DA, Leeper KV, Hull RD, Hales CA, Gottschalk A, Goodman LR, Fowler SE, Buckley JD (2007). "Diagnostic pathways in acute pulmonary embolism: recommendations of the PIOPED II Investigators". Radiology 242 (1): 15–21.

Long QT Syndrome

Definition

Prolonged QT interval; a propensity to ventricular tachy-arrhythmias, syncope, cardiac arrest, or sudden death.

History/Physical Exam

May be congenital or due to hypomagnesemia/kalemia (diuretics, malnourished), hypothermia, Rx (amiodarone, cipralex, methadone, etc). Family history of unexplained sudden death.

Presents with syncope from adrenergic stimuli - such as exercise, emotion, loud noise, swimming.

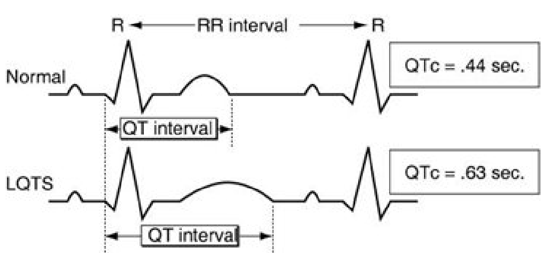
Key 12-Lead Features

QTc > 0.46 (women)
QTc > 0.45 (men)
T-wave alternans

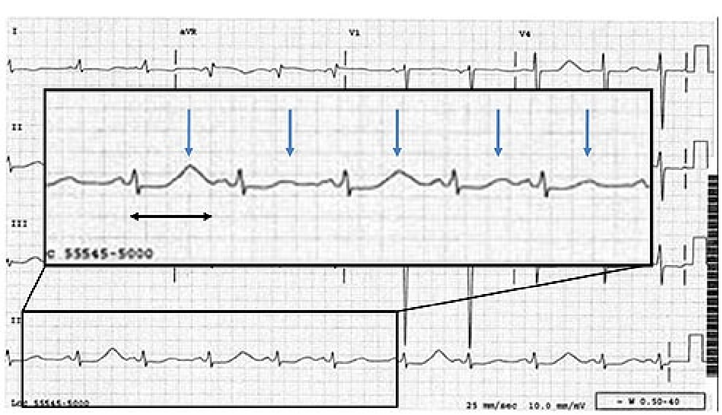
Key Treatment Points

Watch for Torsade de Pointes
If patient arrests, Magnesium Sulfate is indicated

12 Lead ECG Samples



Notice the T-Wave alternans below



Further Reading

References

El-Sherif, N., Turitto, G., & Boutjdir, M. (2017). Congenital Long QT syndrome and torsade de pointes. Annals of Noninvasive Electrocardiology. doi:10.1111/anec.12481.

Hyperkalemia

Definition

Serum potassium > 5.5mEq/L, associated with lethal arrhythmias and hemodynamic compromise.

History/Physical Exam

Hx of renal failure, rhabdomyolysis, burns, potassium-sparing diuretics, NSAIDs, β-blockers.

Often presents with fatigue, weakness, or paresthesia. May present with paralysis, dyspnea, or chest pain.

Key 12-Lead Features

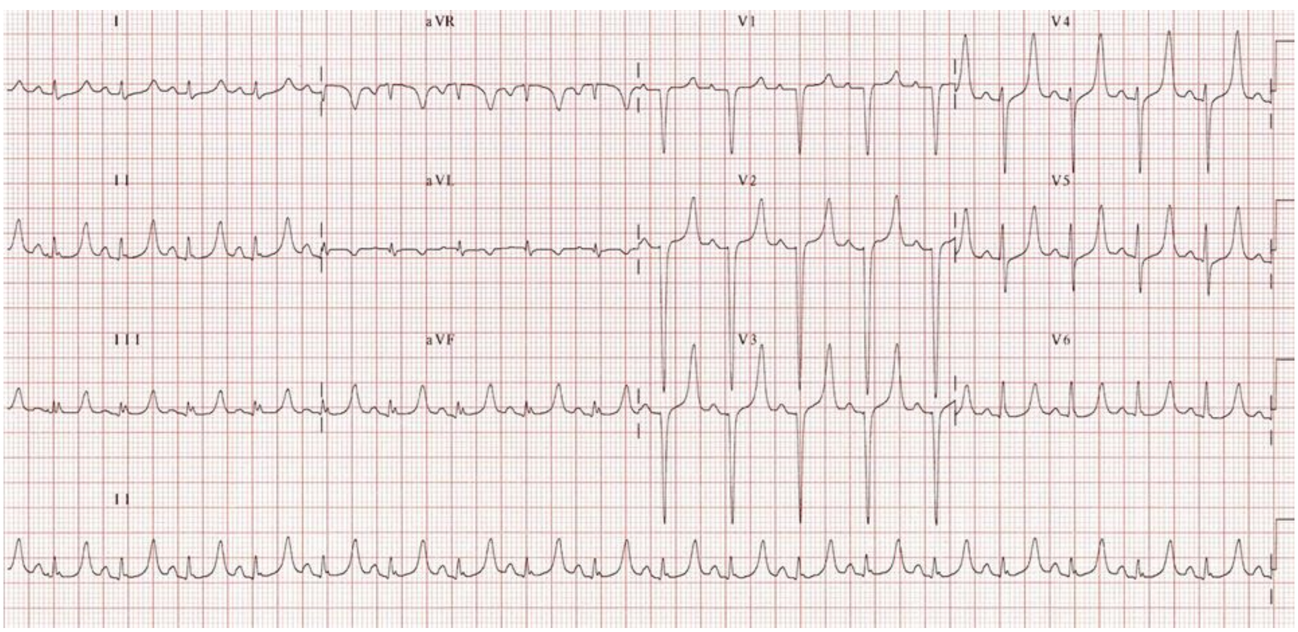
Flattened P waves, prolonged PR intervals, borderline widened QRS complexes and pointed, narrow, and tall tented T waves.

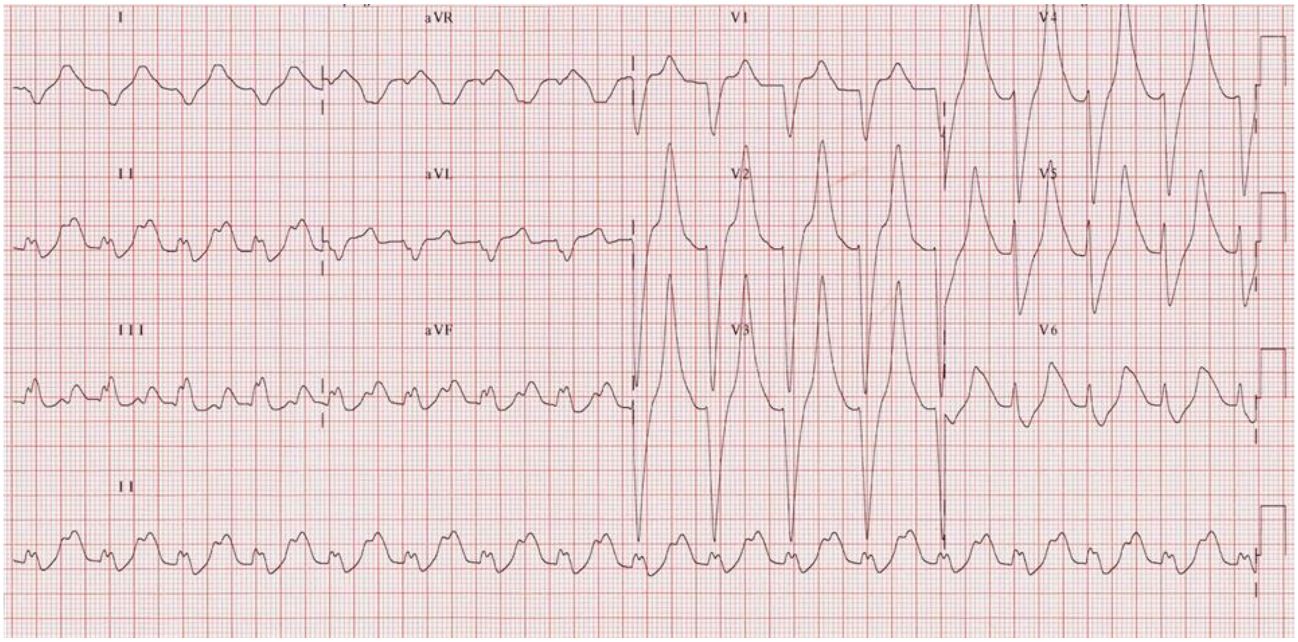
May progress to bradycardia, bizarre and wide QRS complexes, or sine waves.

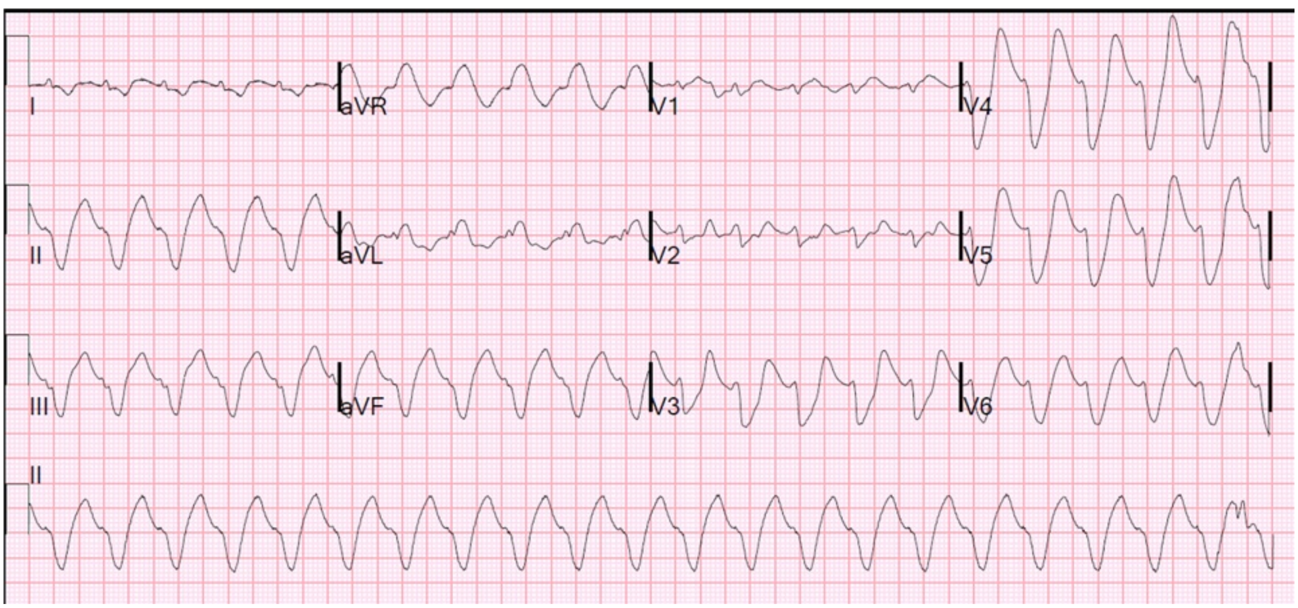
Key Treatment Points

If patient is in arrest, front-load with Calcium Chloride and Sodium Bicarbonate
Salbutamol - 10-20mg nebulized may reduce serum K+ 0.5-1.5mEq

12 Lead ECG Samples







[Further Reading](#)

References

Heidari, S. F. (2016). Life-Threatening Severe Hyperkalemia Presenting Electrocardiographic Changes. Journal of Intensive and Critical Care, 02(03). doi:10.21767/2471-8505.100045.

Brugada Syndrome

Definition

Patients prone to developing arrhythmias and sudden death.

History/Physical Exam

Young, healthy patients - often males. May be of South Asian descent.

Family Hx of sudden cardiac death, often while sleeping. Syncope Hx, generally at rest without prodrome. Night terrors.

Normal Physical Exam.

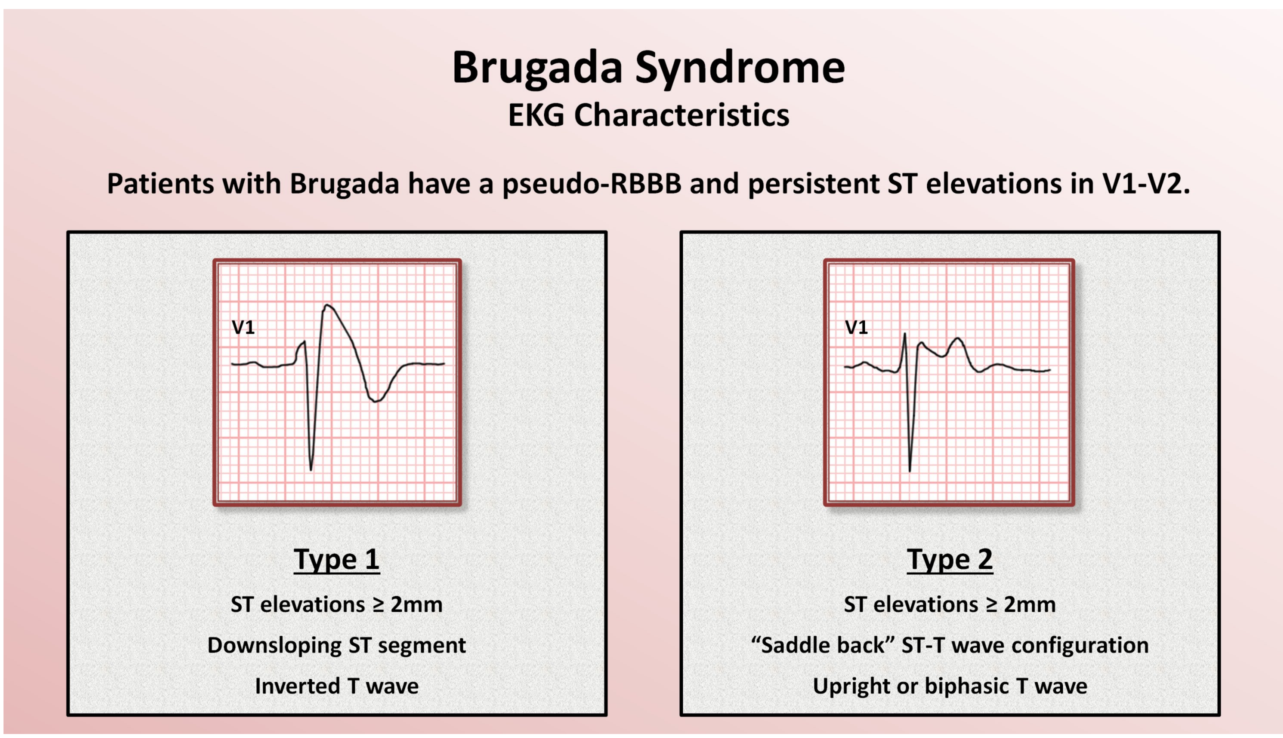
Key 12-Lead Features

Incomplete right bundle-branch block and ST elevations in the anterior precordial leads.

Key Treatment Points

Patient advocacy for a cardiology consult

12 Lead ECG Samples



Further Reading

References

Tse, G., Liu, T., Li, K. H. C., Laxton, V., Chan, Y. W. F., Keung, W., Yan, B. P. (2016). Electrophysiological Mechanisms of Brugada Syndrome: Insights from Pre-clinical and Clinical Studies. Frontiers in Physiology, 7, 467. http://doi.org/10.3389/fphys.2016.00467.

Hypertrophic Obstructive Cardiomyopathy

Definition

Inherited genetic condition in which the heart muscle becomes abnormally thick and prone to tachy-arrhythmias.

History/Physical Exam

Often presents in young, athletic patients.

May present with dyspnea, syncope/presyncope, angina, palpitations, orthopnea, paroxysmal nocturnal dyspnea (PND), CHF, and sudden cardiac death. Additionally, systolic crescendo-decrescendo murmur, decreasing on standing.

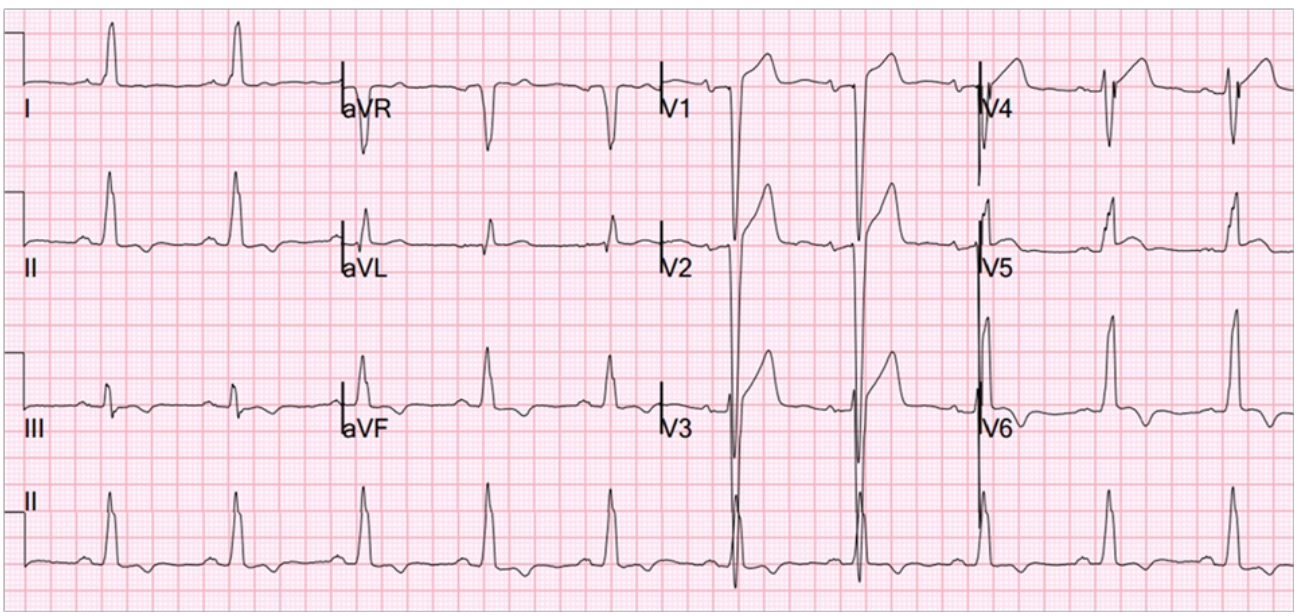
Key 12-Lead Features

High Left Ventricular Volume, possibly w/ pathological Q-waves in lateral/anterior leads, ST changes and/or T wave inversions.

Key Treatment Points

Patient advocacy for a cardiology consult

12 Lead ECG Samples



Further Reading

References

Helmy, S. M., Maauof, G. F., Shaaban, A. A., ElMaghraby, A. M., Anilkumar, S., Shawky, A. H. H., & Hajar, R. (2011). Hypertrophic Cardiomyopathy: Prevalence, Hypertrophy Patterns, and Their Clinical and ECG Findings in a Hospital at Qatar. Heart Views : The Official Journal of the Gulf Heart Association, 12(4), 143–149. http://doi.org/10.4103/1995-705X.90900.

Wellens Syndrome

Definition

Pre-infarction stage of coronary artery disease suggesting 80-90% LAD occlusion that often progresses to a devastating anterior wall MI.

History/Physical Exam

Following an ischemic event suggestive of unstable angina. ECG findings are generally only visible once patient is pain free.

Key 12-Lead Features

TYPE A: Biphasic T waves, most commonly in leads V2 and V3. Presents with upstroke/down-stroke. Approximately 25% of the time.

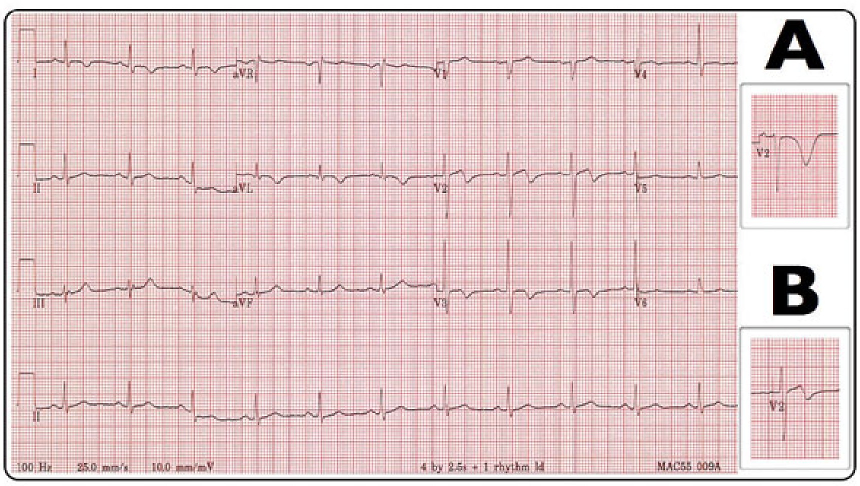
TYPE B: Deep inversion of the T-wave segment in the precordial leads, V1-V4. Approximately 75% of the time.

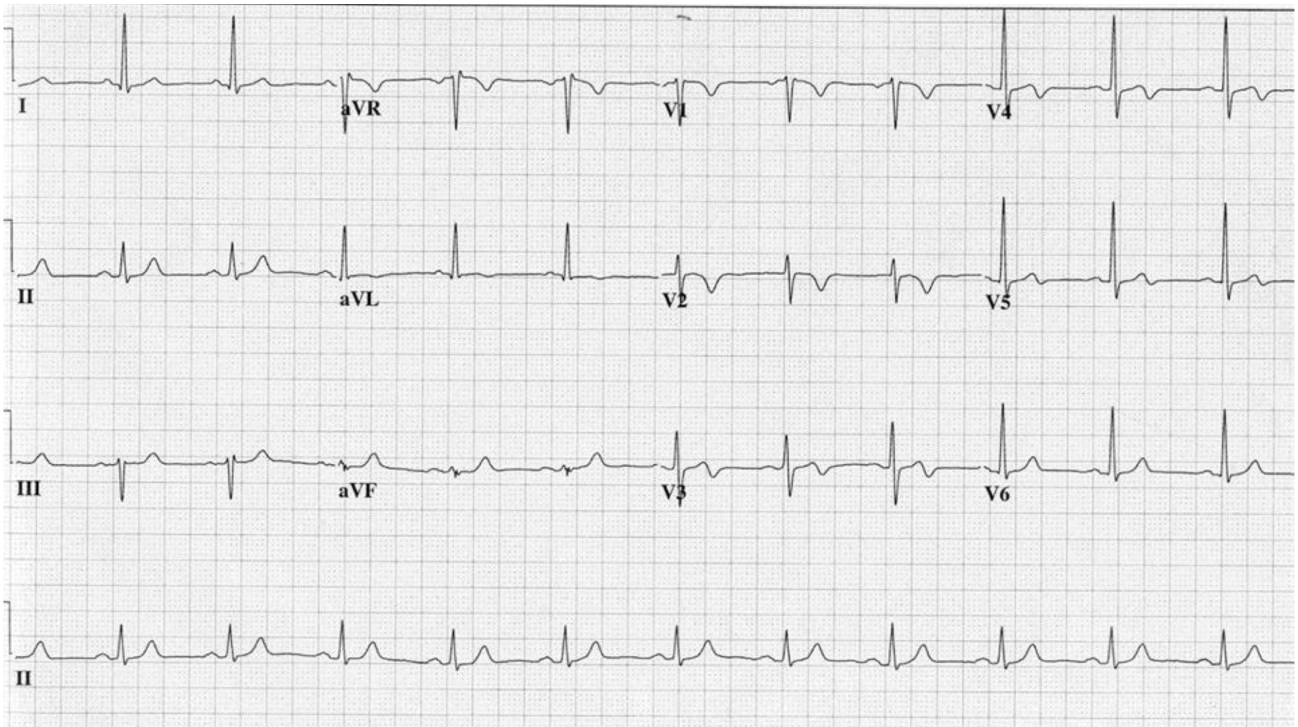
Key Treatment Points

Patient advocacy for a cardiology consult

Monitor for potential emerging STEMI

12 Lead ECG Samples





[Further Reading](#)

References

Rhinehardt J, Brady WJ, Perron AD, Mattu A. Electrocardiographic manifestations of Wellens' syndrome. Am J Emerg Med. 2002 Nov;20(7):638-43. PubMed PMID: 12442245.

Left Bundle Branch Block

Definition:

Conduction abnormality of the left ventricle, causing wide QRS complexes and ST changes mimicking STEMI.

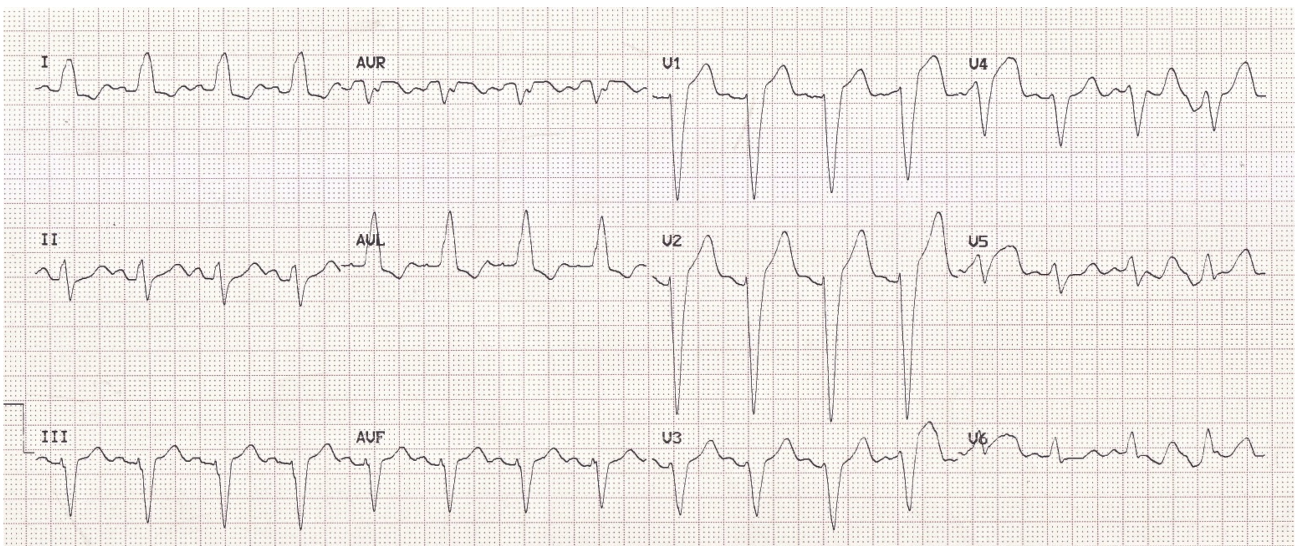
History/Physical Exam:

History of CAD, hypertension, previous MI.

Key 12-Lead Features:

- QRS > 120ms
- Prominent S (V1-3) / prominent R (V5/6, I/aVL)
- ST Elevation common in V1-4
- See Sgarbossa Criteria for Diagnosing MI in the presence of LBBB

12 Lead Sample



References

1. Da Costa D, et al. Bradycardias and atrioventricular conduction block. 2002. [Link]

Benign Early Repolarization

Definition:

Benign ECG pattern mimicking STEMI.

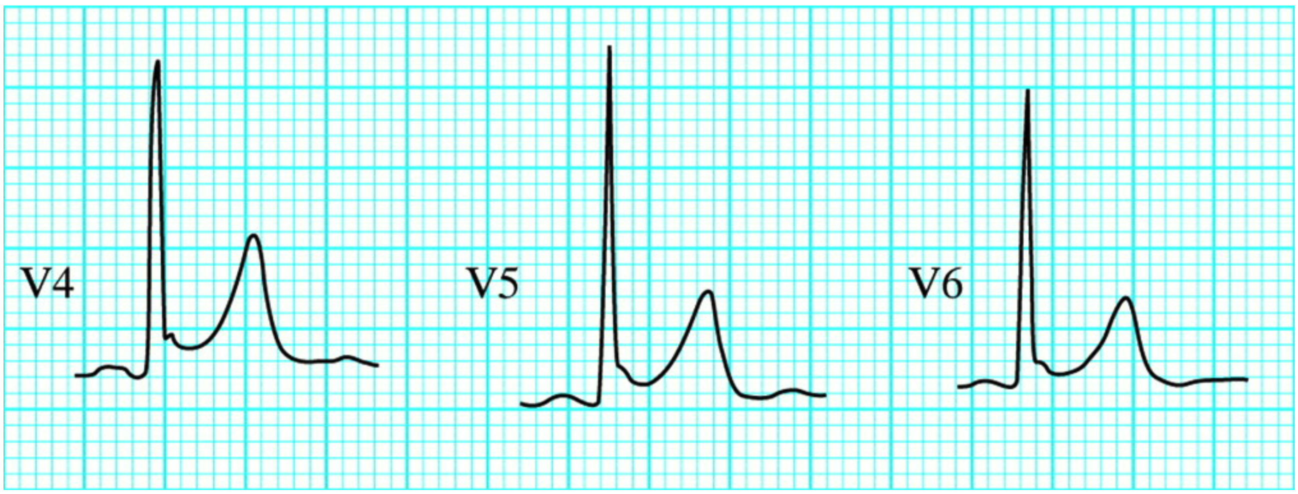
History/Physical Exam:

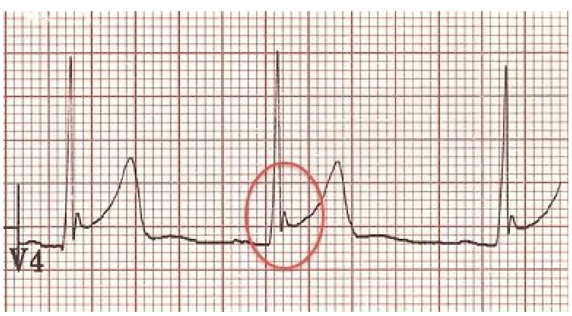
Often young healthy males. May be found with concurrent chest pain. Common < 50 y/o, rare > 70 y/o.

Key 12-Lead Features:

- Widespread concave ST elevation with J point elevation
- May have 'fish-hooked' Osborne wave
- No reciprocal ST depression to suggest STEMI (except in aVR)
- ST changes are relatively stable over time (no progression on serial ECG tracings)

12 Leads Samples





References

1. Edhouse J, et al. ABC of clinical electrocardiography: Acute myocardial infarction-Part II. 2002. [Link]
2. Haïssaguerre M, et al. Sudden cardiac arrest associated with early repolarization. 2008. [Link]

Pericarditis

Definition

Inflammation of the pericardium.

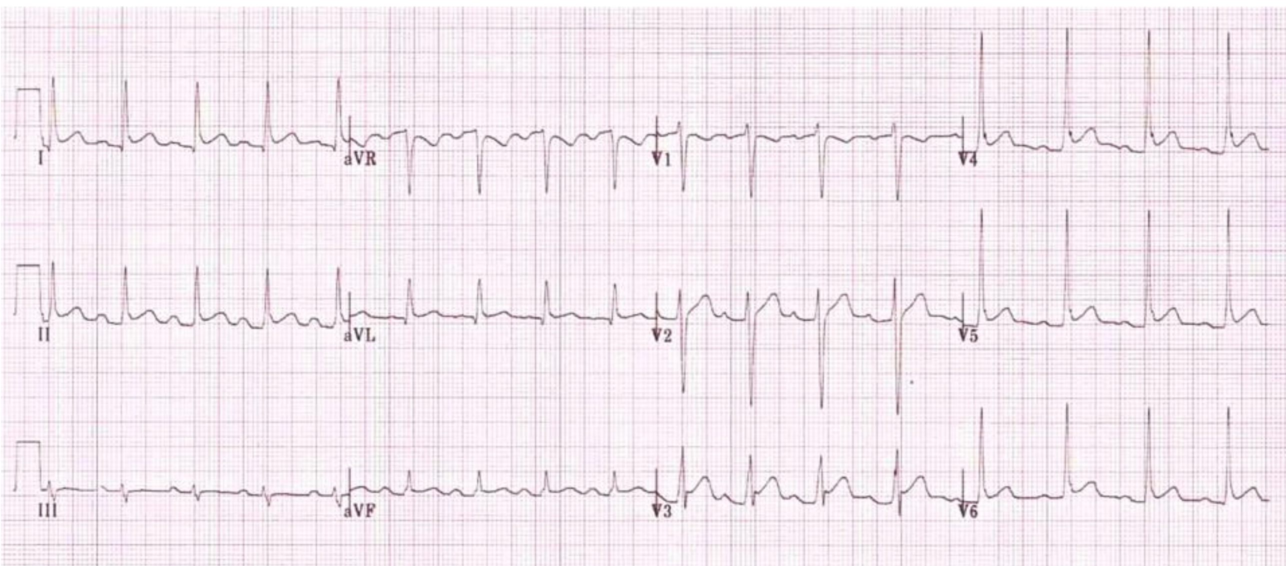
History/Physical Exam

- Recent MI or CABG surgery, recent infection, recent chest trauma, chronic immune suppression, HIV. Sharp, pleuritic sub-sternal pain worsening when supine.
- May have a pleural friction rub. May demonstrate Beck's triad - hypotension, muffled heart sounds, and JVD.

Key 12-Lead Features

- Widespread concave ST elevation and PR depression
- Reciprocal ST depression and PR elevation in lead aVR
- Measure baseline via TP Segment
- Sinus tachycardia is also common in acute pericarditis due to pain and/or pericardial effusion

Sample 12 Lead



References

1. Kinyasheva, N. Acute Pericarditis Within The Differential Diagnosis Of Chest Pain. 2017. [Link]

Left Ventricular Hypertrophy

Definition

Enlargement of the Left Ventricle of the heart, causing ECG changes that may mimic STEMI but which are generally benign.

History/Physical Exam

History may include hypertension, aortic stenosis, hypertrophic cardiomyopathy.

Key 12-Lead Features

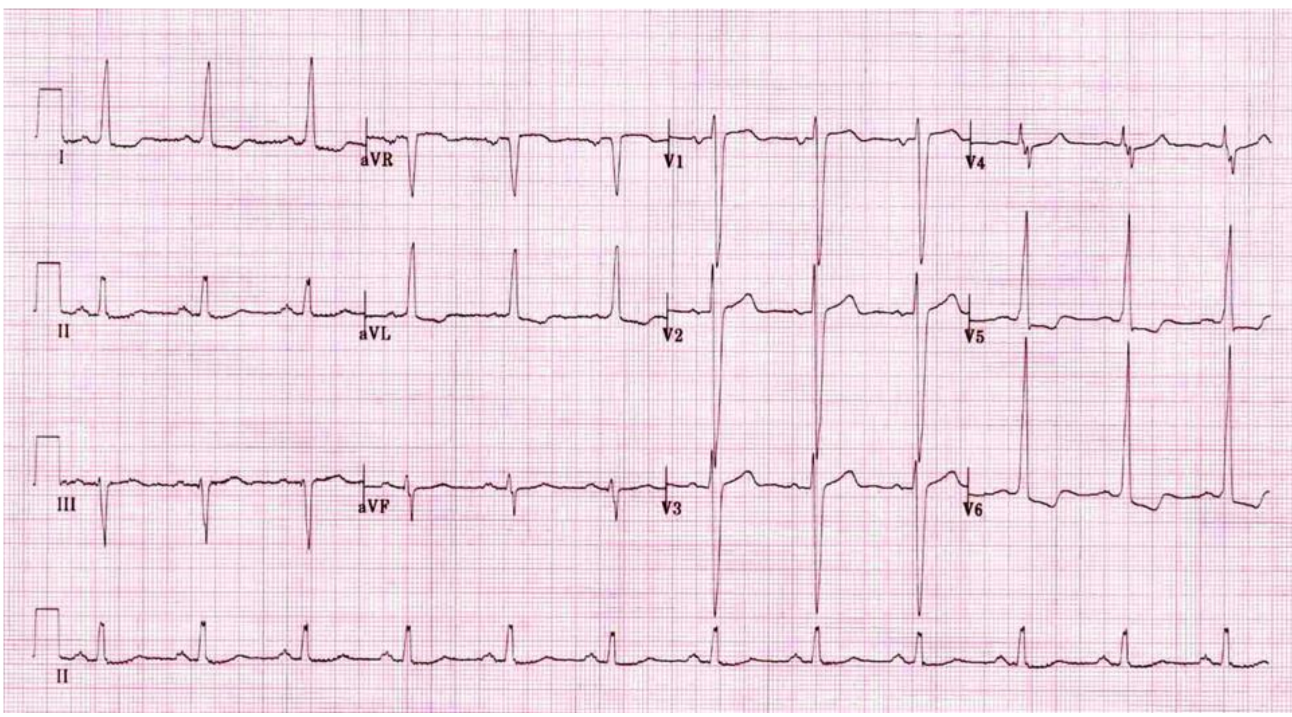
Presence of LVH

- S(V1 or V2) + R(V5 or V6) > 35mm

Strain Pattern

- ST Elevation V1-4
- ST Depression / Inverted T waves V5 and V6
- Generally proceeds from most elevated V1/2 to most depressed V6
- Consider utilizing LP15 measurements to help identify

12 Lead ECG Sample



[Further Reading]

Reference

1. Ogah OS, et al. Electrocardiographic left ventricular hypertrophy with strain pattern: Prevalence, mechanisms and prognostic implications. 2008. [Link]

DeWinter's T-Waves

Definition

Early warning of an evolving STEMI.

History/Physical Exam

History and findings suggestive of acute coronary syndrome.

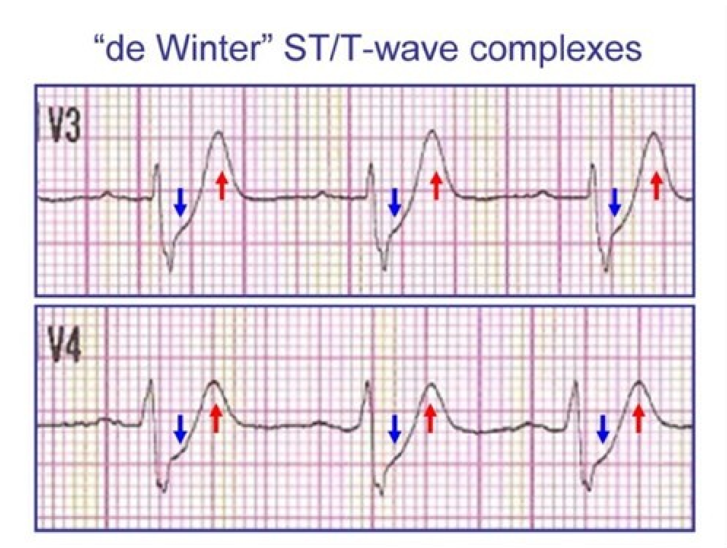
Key 12-Lead Features

- J-Point depression with up-sloping ST segments.
- Tall, prominent, symmetric T waves in the precordial leads.
- Upsloping ST segment depression > 1mm at the J-point in the precordial leads.
- Absence of ST elevation in the precordial leads.
- ST segment elevation (0.5mm-1mm) in aVR.
- “Normal” STEMI morphology may precede or follow the DeWinter pattern.

Key Treatment Points

- Patient advocacy for a cardiology consult
- Monitor for potential emerging STEMI

12 Lead ECG Samples



[Further Reading]

References

1. DeWinter et al. A new ECG sign of proximal LAD occlusion. 2008. [Link]

Sgarbossa Criteria

Definition

Used to identify AMI in the presence of LBBB or a paced rhythm.

History/Physical Exam

History and findings suggestive of acute coronary syndrome.

Key 12-Lead Features

ST elevation ≥ 1 mm in a lead with upward (concordant) QRS complex	5 pts
ST depression ≥ 1 mm in lead V1, V2, or V3	3 pts
ST elevation ≥ 5 mm in a lead with downward (discordant) QRS	2 pts

≥ 3 points = 90% specificity of STEMI (sensitivity of 36%)

Smith's Modified Sgarbossa

Replacement of Rule III: discordant ST-elevation measurement of > 5 mm with

Smith's Rule: ST/S ratio greater than 0.25 = STEMI

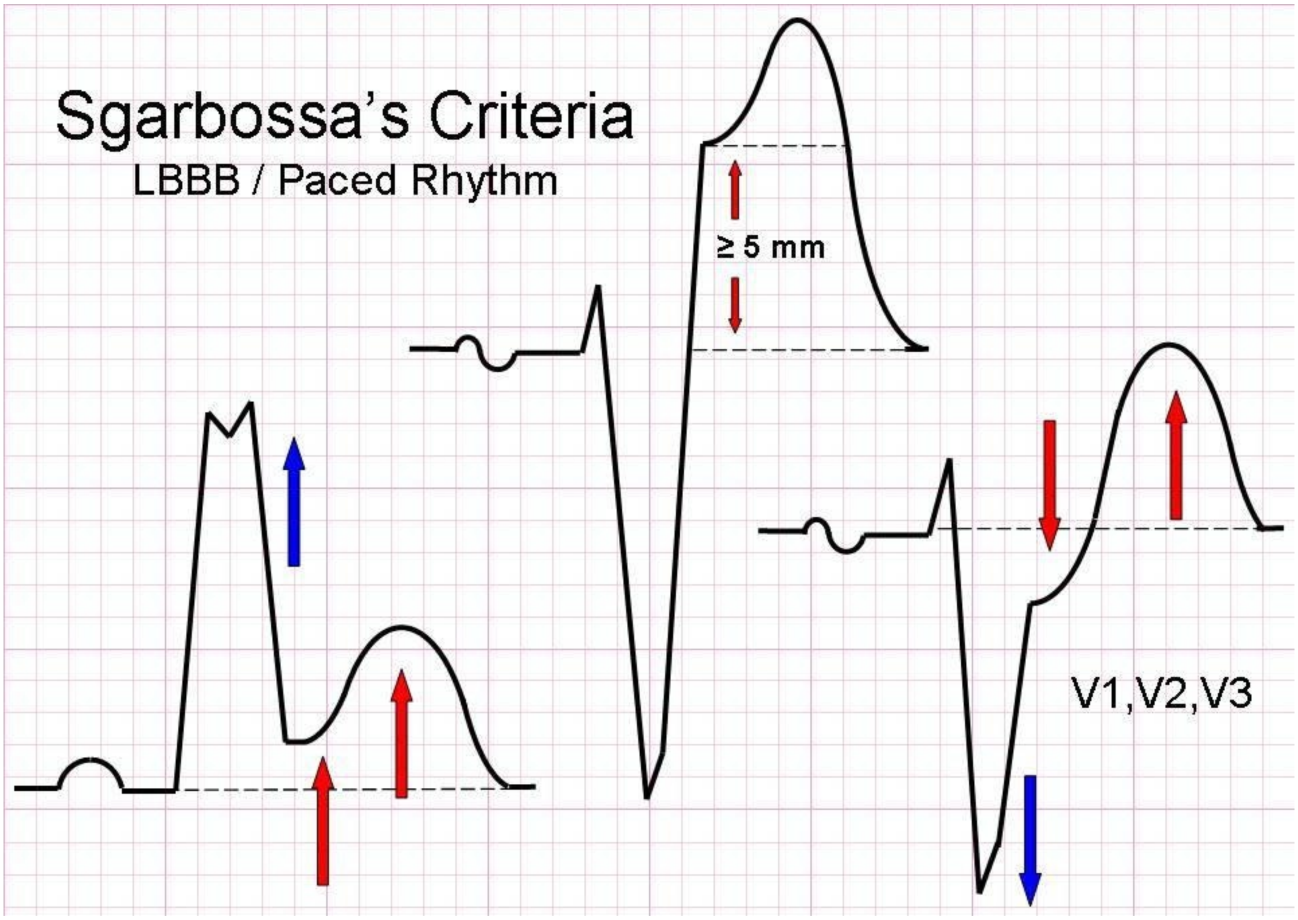
- Measure the ST Segment Elevation in mm [X]
- Measure the height/depth of the S/R wave in mm [Y]
- X ÷ Y = Z
- Z > 0.25 = STEMI

Sensitivity: 91%
Specificity: 90%

Key Treatment Points

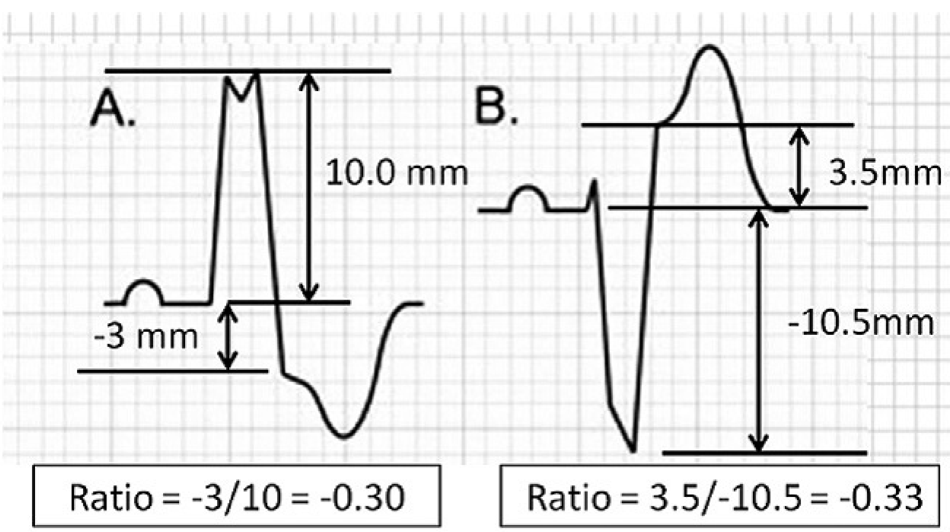
- Transmit as per current guidelines if believed ischemic
- Convey to PCI capable hospital
- Monitor for 12-lead changes and patient decompensation
- Treat as Acute Coronary Syndrome
- Patient advocacy at the hospital

12 Lead ECG Samples



Smith's Modified Sgarbossa

Despite lacking > 5 mm elevation, both complexes below shown are positive for STEMI, due to ratios exceeding 0.25



Further Reading

References

1. Rodriguez, RM. Electrocardiographic Criteria for Detecting Acute Myocardial Infarction in Patients With Left Bundle Branch Block:

A Meta-analysis. 2006. [Link]

Wellens Syndrome

Definition

Pre-infarction stage of coronary artery disease suggesting 80-90% LAD occlusion that often progresses to a devastating anterior wall MI.

History/Physical Exam

Following an ischemic event suggestive of unstable angina. ECG findings are generally only visible once patient is pain free.

Key 12-Lead Features

TYPE A: Biphasic T waves, most commonly in leads V2 and V3. Presents with upstroke/down-stroke.

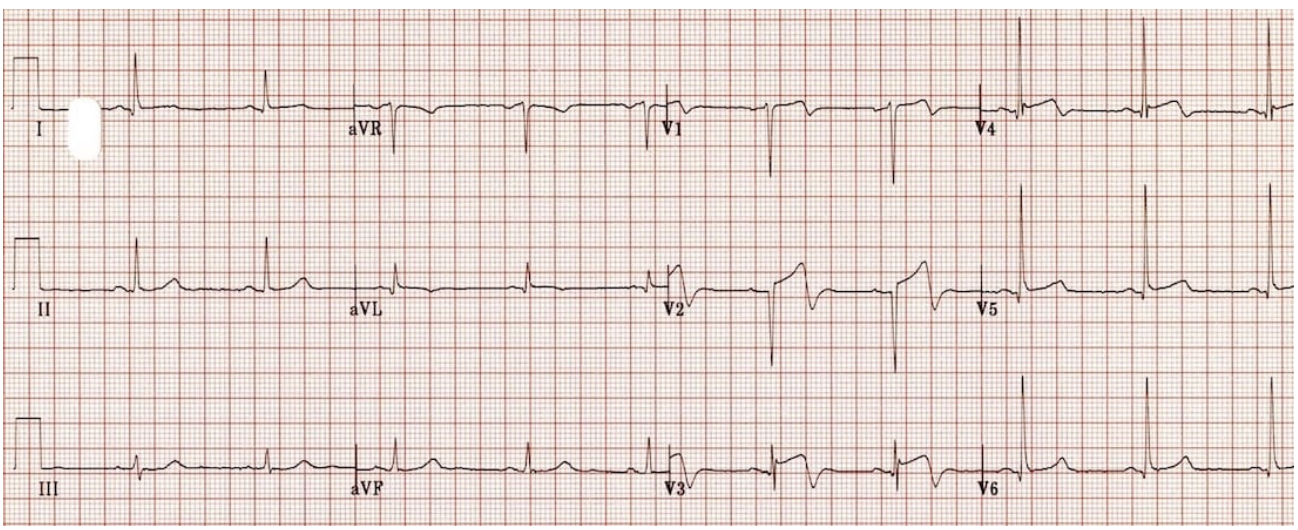
TYPE B: 76% of the time, deep inversion of the T-wave segment in the precordial leads, V1-V4.

Key Treatment Points

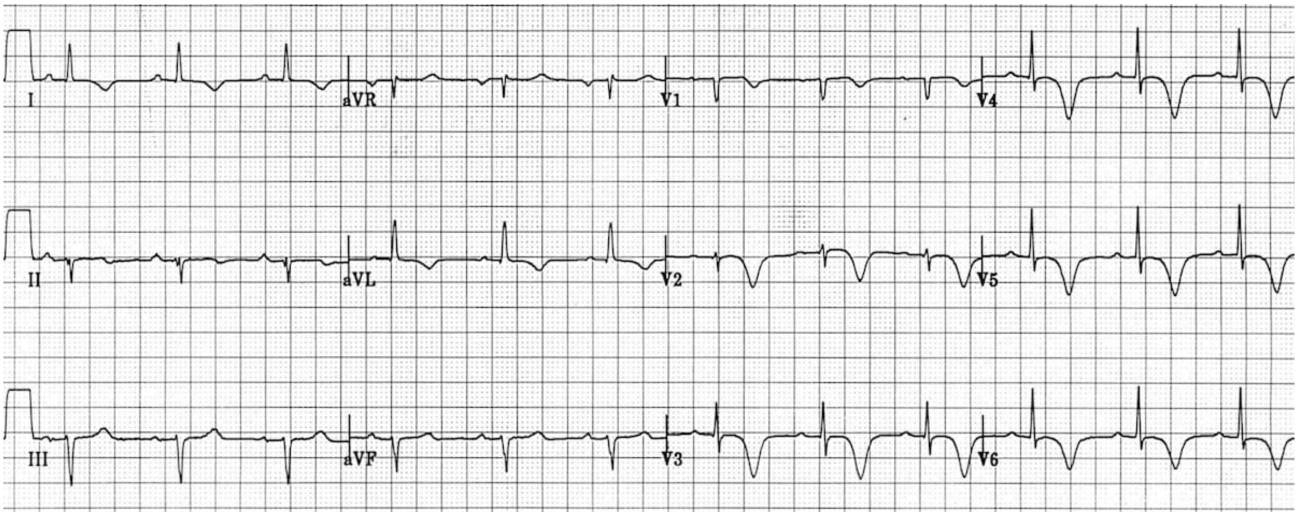
- Patient advocacy for a cardiology consult
- Monitor for potential emerging STEMI

12 Lead ECG Samples

TYPE A



TYPE B



Further Reading

References

1. Rhinehardt J, et al. Electrocardiographic manifestations of Wellens' syndrome. 2002. [Link]

aVR STEMI

Definition

Electrical activity from the right upper portion of the heart is recorded by aVR. Infarction in this area produces ST elevation in aVR and reciprocal changes in leads I, II, aVL, and V4-6.

Indicative of Left Main coronary artery occlusion, though can also reflect proximal LAD occlusion or severe triple-vessel disease.

History/Physical Exam

History and findings suggestive of acute coronary syndrome.

Key 12-Lead Features

- Widespread horizontal ST depression (often I, II, aVL, and V4-6)
- ST elevation in aVR ≥ 1mm
- ST elevation in aVR ≥ V1
- aVR elevation in the presence of a tachycardia is often rate related and not suggestive of LMCA occlusion

Key Treatment Points

- Transmit as per current guidelines if believed ischemic
- Convey to PCI capable hospital
- Monitor for 12-lead changes and patient decompensation
- Treat as Acute Coronary Syndrome
- Patient advocacy at the hospital

Predictive Value of aVR Elevation

In the context of widespread ST depression + symptoms of myocardial ischemia:

- STE in aVR ≥ 1mm indicates proximal LAD / LMCA occlusion or severe 3VD
- STE in aVR ≥ 1mm predicts the need for CABG
- STE in aVR ≥ V1 differentiates LMCA from proximal LAD occlusion
- Absence of ST elevation in aVR almost entirely excludes a significant LMCA lesion

In the context of anterior STEMI:

- STE in aVR ≥ 1mm is highly specific for LAD occlusion proximal to the first septal branch

Magnitude of ST elevation in aVR is correlated with mortality in patients with acute coronary syndromes:

- STE in aVR ≥ 0.5mm was associated with a 4-fold increase in mortality
- STE in aVR ≥ 1mm was associated with a 6- to 7-fold increase in mortality
- STE in aVR ≥ 1.5mm has been associated with mortalities ranging from 20-75%

12 Lead ECG Sample

[Further Reading]

References

1. Aygul N, et al. Value of lead aVR in predicting acute occlusion of proximal left anterior descending coronary artery and in-hospital outcome in ST-elevation myocardial infarction: An electrocardiographic predictor of poor prognosis. 2008. [Link]
2. Barrabes JA, et al. Prognostic value of lead aVR in patients with a first non-ST-segment elevation acute myocardial infarction. 2003. [Link]
3. Nabati M, et al.. ST-segment elevation in lead aVR in the setting of acute coronary syndrome. 2016. [Link]

Posterior STEMI

Definition

History and findings suggestive of acute coronary syndrome.

History/Physical Exam

History and findings suggestive of acute coronary syndrome.

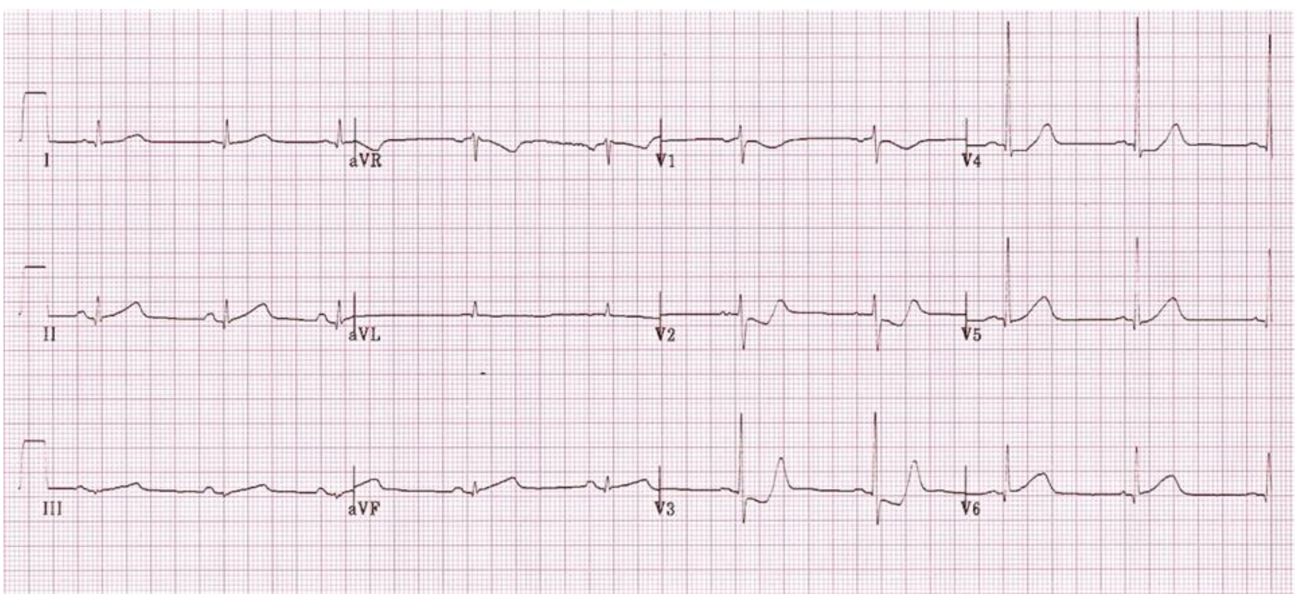
Key 12-Lead Features

- Suspect Posterior MI with marked Precordial ST Depression V1-4 > 1mm (sensitive)
- ST Elevation in V7/8/9 > 0.5mm adds specificity

Key Treatment Points

- Transmit as per current guidelines if believed ischemic
- Convey to PCI capable hospital
- Monitor for 12-lead changes and patient decompensation
- Treat as Acute Coronary Syndrome
- Patient advocacy at the hospital

12 Lead ECG Sample



Further Reading

References

1. Van Gorselen, EOF, et al. Posterior myocardial infarction: The dark side of the moon. 2007. [Link]

STEMI Patterns

AHA Guidelines for Classifying STEMI

ST-elevation in 2 anatomically contiguous leads measuring:

- Men < 40 years of age: 2.5 mm in V2-V3 and 1 mm in all other leads
- Men ≥ 40 years of age: 2 mm in V2-V3 and 1 mm in all other leads
- Women: 1.5 mm in V2-V3 and 1 mm in all other leads

70% sensitivity, 85% specificity for acute coronary occlusion

Localizing STEMI

I HIGH LATERAL LCX	aVR (MAINSTEM) Suspect Proximal LAD or Severe 3VD	V1 SEPTAL LAD	V4 ANTERIOR LAD
II INFERIOR RCA	aVL HIGH LATERAL LCX	V2 SEPTAL LAD	V5 LATERAL LAD / LCX
III INFERIOR RCA	aVF INFERIOR RCA	V3 ANTERIOR LAD	V6 LATERAL LAD / LCX

Further Reading

References

1. O'Gara PT, et al. 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction: Executive Summary: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. 2012. [Link]

PR17: Procedural Sedation

Mike Sugimoto

Applicable To

- ACP and higher

Introduction

Procedural sedation and analgesia (PSA) is a medication administration strategy that uses several small serial doses of a medication to produce analgesia, sedation, and amnesia to allow paramedics to accomplish patient care tasks.

Indications

Any instance where analgesia, sedation, and amnesia are required to allow paramedics to accomplish patient care tasks. Examples of these tasks include extrication, fracture management, cardioversion, and airway management.

Contraindications

- ABSOLUTE: INABILITY TO MONITOR OXYGENATION AND VENTILATION
- ABSOLUTE: INABILITY TO PERFORM AIRWAY INTERVENTIONS
- Relative: traumatic brain injuries
- Relative: hypotension and shock

Procedure

ClinCall consultation required prior to undertaking procedure on patients under 12 years of age.

ClinCall consultation recommended to discuss care planning options for all other patients, where possible.

1. Ensure adequate oxygenation and ventilation at all times. Consider use of high-flow nasal cannula with PEEP and bag-valve mask as necessary. Monitor oxygen saturation and ventilation closely.
2. If not already in place, establish vascular access with running fluid.
3. Choose dosing strategy for ketAMINE:
   - Initial dose: 0.5 mg/kg
   - Subsequent doses: 0.25 mg/kg
   - Give ketAMINE slowly, waiting 60 seconds between doses, until the desired level of sedation is reached.
   - In patients who are hypotensive or in shock, consider reducing the doses of ketAMINE further.
     - ClinCall consultation recommended to discuss care planning options.
4. Some patients will experience emergence reactions from ketAMINE sedation and analgesia. These include hallucinations, vocalizations, and can have physical manifestations. Treat emergence reactions only if they occur and are sustained:
   - In adults: mIDAZOLam 1-2 mg IV/IO/IM every 2-3 minutes as required.
   - In children: mIDAZOLam 0.1-1 mg/kg IV/IO/IM every 2-3 minutes as required.

PR18: Anesthesia Induction

Mike Sugimoto

Applicable To

ACP and higher

Introduction

Anesthesia Planning

In the context of BCEHS practice, planning for anesthesia is synonymous with planning for invasive airway management. Patients who are not completely obtunded will require some level of sedation and anesthesia prior to being intubated. Paramedics must consider multiple factors when planning an induction strategy.

The goals of anesthesia, for all patients, are four-fold:

1. Amnesia - Critical to the long-term psychological well-being of patients being intubated; can be achieved with the use of ketAMINE or mIDAZOLam.
2. Analgesia - In addition to reducing patient discomfort, effective analgesia reduces the amount of sedation required post-intubation; can be achieved using ketAMINE and fentaNYL.
3. Autonomic stability - Virtually all patients being intubated in the out-of-hospital setting require some degree of resuscitation during the peri-intubation phase. Hypotension post-intubation can be lethal. Autonomic stability can be achieved using fluid and push-dose vasopressors such as PHENYLephrine or EPINEPHrine.
4. Areflexia - The loss of muscle tone and suppression of reflexes improves the overall ability of the intubator to access the trachea. Effective areflexia also lowers the total sedation requirements. It is, however, fraught with complications and can be extremely dangerous. Succinylcholine and rocuronium are used to achieve areflexia; deep sedation does not produce areflexia, but instead suppresses the response to painful stimulus.

Shock Physiology

Maintaining autonomic stability is critical to ensuring patient safety in the peri-intubation period. Because good outcomes cannot be achieved from a poor starting point, all patients must be adequately resuscitated prior to intubation. At a minimum, this involves a fluid bolus of normal saline of at least 500 mL.

The shock index (SI) is calculated by dividing the heart rate by the systolic blood pressure. Normal physiology has a shock index of less than 1; shocked states have an index of greater than 1. An approximation can be made by comparing the heart rate to the systolic blood pressure: if the heart rate is greater than the systolic blood pressure, the patient requires additional support during the peri-intubation phase. In these cases, PHENYLephrine as a push-dose vasopressor is used to help support blood pressure prior to and after intubation. EPINEPHrine is also available as a push-dose vasopressor for critically ill patients who are at imminent risk of cardiac arrest.

Summary of Pharmacology

Goal	Options	Induction	Maintenance	Emergence
Analgesia	fentanyl ketAMINE	Covered with KetAMINE	Covered with ketAMINE	fentaNYL 50 - 100 mcg as required
Amnesia	mIDAZOLam ketAMINE	**Adult:** ketAMINE 2 mg/kg if SI < 1 ketAMINE 1 mg/kg if SI ≥ 1 **Pediatric:** ketAMINE 1 mg/kg if perfusion is normal ketAMINE 0.5 mg/kg if hypoperfusion present Consider ½ normal ketAMINE dose if GCS < 8	Use ½ of induction dose every 10-5 minutes as required	mIDAZOLam 1 - 5 mg as required
Autonomic Stability	IV fluids PHENYLephrine EPINEPHrine	Normal saline 500 mL PHENYLephrine 100 mcg IV to achieve SBP ≥ 90 mmHg EPINEPHrine 10 mcg slow IV push in peri-arrest	Normal saline 500 mL as required PHENYLephrine 100 mcg IV as required	Normal saline as required
Areflexia	ROCuronium Succinylcholine	Not available to advanced care paramedics at BCEHS		

Contraindications

- Absolute: inability to monitor oxygenation and ventilation
- Absolute: inability to perform airway interventions
- Relative: traumatic brain injuries
- Relative: hypotension and shock

Consider the use of alternative techniques (e.g., supraglottic airway devices, awake intubation techniques) if induction of anesthesia is judged unsafe, or if it cannot be accomplished due to logistical factors.

Procedure

1. Ensure adequate oxygenation and ventilation throughout the procedure. Monitor pulse oximetry, blood pressure, and heart rate. Assign roles and delegate tasks as part of crew resource management. ClinCall consultation is required to discuss care planning options in patients with perfusing rhythms if clinical situation permits. Retrospective consultation is required post-intubation to support clinical decision-making and airway quality assurance.
2. If not already done, establish vascular access and verify the line is patent.
3. Prepare and label medications, including vasopressors, based upon shock index calculation. PHENYLephrine should be available at all times to manage post-intubation hypotension.

For adult patients

4. Start normal saline bolus of 500 mL
5. If shock index ≥ 1 (or predictors of hypotension are present):
   - PHENYLephrine 100 mcg IV/IO every 3-5 minutes as required to maintain systolic blood pressure ≥ 90 mmHg
   - ketAMINE 1 mg/kg IV/IO
6. If shock index < 1:
   - ketAMINE 2 mg/kg IV/IO
7. For maintenance:
   - ketAMINE: ½ of the induction dose every 10-15 minutes as required to maintain sedation
   - fentaNYL: 50-100 mcg IV/IO every 10-15 minutes as required if pain is believed to be a major factor
   - Normal saline: 250-500 mL as required

    - PHENYLephrine: 100 mcg IV/IO every 3-5 minutes as required to a maximum of 500 mcg.
        - CliniCall consultation required if additional PHENYLephrine is needed.

For pediatric patients

4. Start normal saline bolus of 10 mL/kg
5. If signs of inadequate perfusion are present - relative bradycardia; SBP < 70 + (2 x age):
    - EPINEPHrine 1 mcg/kg slow IV/IO every 3-5 minutes as required
    - ketAMINE 0.5 mg/kg IV/IO
6. In patients with adequate perfusion and heart rate:
    - ketAMINE 1 mg/kg IV/IO
    - EPINEPHrine on "stand-by" 1 mcg/kg slow IV/IO every 3-5 minutes as required
7. For maintenance:
    - ketAMINE: ½ of the induction dose every 10-15 minutes as required to maintain sedation
    - MIDAZOLam: consider addition of benzodiazepine at 0.1 mg/kg as required
    - fentaNYL: consider 1-3 mcg/kg IV/IO every 10-15 minutes if pain is believed to be a major factor
    - Normal saline: 10 mL/kg as required
    - EPINEPHrine: 1 mcg/kg slow IV/IO as required

PR19: Transcutaneous Pacing

Mike Sugimoto

Applicable To

- ACP and higher

Indications

- Symptomatic bradycardia unresponsive to atropine and epinephrine infusions

Contraindications

Paramedics should be aware of the distinction between pacing modes: demand pacing paces only when the patient's intrinsic heart beat is less than a specified threshold, while non-demand paces at a set rate regardless of intrinsic activity. The monitor/defibrillator only detects electrical activity: under some circumstances, patients may have electrical activity that exceeds the pacing threshold but no mechanical output. In these cases, the patient will not be paced if the monitor is in demand mode. BCEHS monitor/defibrillators default to demand mode and, in general, should not be operated in non-demand mode.

Procedure

1. Transcutaneous pacing requires placement of limb leads and therapy electrodes. Ensure that limb leads are on and connected to the LifePak 15.
2. Position therapy electrodes. Either anterior-lateral or anterior-posterior electrode placement is acceptable.
3. Consider the need for sedation. Pacing is painful and patients who are conscious will require sedation and analgesia. Ketamine is the preferred agent in this case.
4. Enable pacing mode on the LifePak by pushing the "Pacing" button. The monitor will prompt for a rate (the default is 60 BPM) and a current (the default is 0 mA).
5. Slowly increase the current using the selector wheel until electrical capture is identified.
6. Confirm a mechanical output with each captured paced beat. Femoral pulses may be more useful as they are further away from the muscle groups being stimulated by the pacemaker. If mechanical output is confirmed, add 10% to the current setting.
7. Reassess blood pressure and clinical status. If the patient remains hypotensive despite effective pacing, consider increasing the rate.

Notes

CAUTION

- When conducting handovers of pacing-dependent patients at hospitals, clear communication and coordination of the transfer of pacemaking equipment is critical. Do not disconnect monitor components, *including limb leads*, until hospital staff confirms the patient is attached to their equipment and ready to take over pacing.
- Never attempt to resolve tachydysrhythmias using non-demand or "overdrive" pacing.
- When using non-demand pacing, there is a risk of causing an R-on-T event resulting in ventricular fibrillation or ventricular tachycardia, as the monitor will deliver pacing impulses regardless of intrinsic electrical activity. In situations where the patient is bradycardic but has electrical activity that exceeds the rate limit for demand pacing, CliniCall consultation is recommended to discuss care planning options, which may include higher pacing rates or pharmacological therapy.

PR20: Synchronized Cardioversion

Mike Sugimoto

Applicable To

ACP and higher

Indications

- Termination of tachydysrhythmias in symptomatic patients who have failed less invasive therapies
    - It is often more effective and consistent than pharmacological therapies and is generally safer for unstable patients when the precise nature of the tachydysrhythmia is not known.

Procedure

1. Consider the need for procedural sedation (see PR17: Procedural Sedation).
2. Attach therapy electrodes. Either anterior-posterior or anterior-lateral positioning may be used. Synchronized cardioversion may be performed with therapy electrodes alone, however limb leads are strongly suggested.
3. Enable synchronized mode: press the **SYNC** button on the monitor. Observe the display screen and confirm the flagging symbol (a downward-pointing triangle) appears above each QRS complex.
    - On LifePak 15s that have been configured for primary care paramedic use, pressing **SYNC** or **LEAD** will not disable the advisory monitoring system, and will not provide access to synchronization functions. To enable synchronization on these devices, press **ENERGY SELECT** to exit the advisory mode and enable full manual operation. **CAUTION:** This is a slight change from previous workflows, and is only required on LifePak 15s that have been configured for primary care paramedic use. A patient safety risk exists where energy levels may be set for cardioversion, but synchronization has not occurred. **Always visually verify the presence of synchronization markers above the QRS complexes before charging the defibrillator for cardioversion or attempting to deliver energy.**
4. Select the appropriate energy level using the **ENERGY SELECT** buttons.
5. Charge the monitor/defibrillator and clear the patient.
6. Push ***and hold*** the **SHOCK** button until the energy is delivered. There will be a slight delay as the monitor attempts to time the shock with a detected R wave.
7. Reassess the patient and re-evaluate required treatment options, including supportive care or energy escalation.
8. If the patient deteriorates to ventricular fibrillation or unstable polymorphic ventricular tachycardia:
    - Confirm synchronization is off (push **SYNC** button again if necessary) and that flags have disappeared. Verify patient pulses; if no pulse, begin chest compressions.
    - Reset the energy level to 200 J.
    - Charge the monitor.
    - Clear the patient and deliver the shock.

Notes

- Recommended initial energy levels:
    - Unstable atrial fibrillation with rapid ventricular response: 200 J.
    - Unstable monomorphic ventricular tachycardia: 100 J.
    - Unstable supraventricular tachycardia or atrial flutter: 100 J.
- If several synchronized shocks have been delivered and the rhythm fails to convert, consider switching pad placement: if the therapy electrodes were anterior-lateral, place them anteriorly-posteriorly (or vice versa) and attempt to cardiovert again at the last energy level used.

Changelog

- 2023-01-05: added supplemental information on use of PCP-configured monitor/defibrillators

PR21: Needle Thoracentesis

Mike Sugimoto

Applicable To

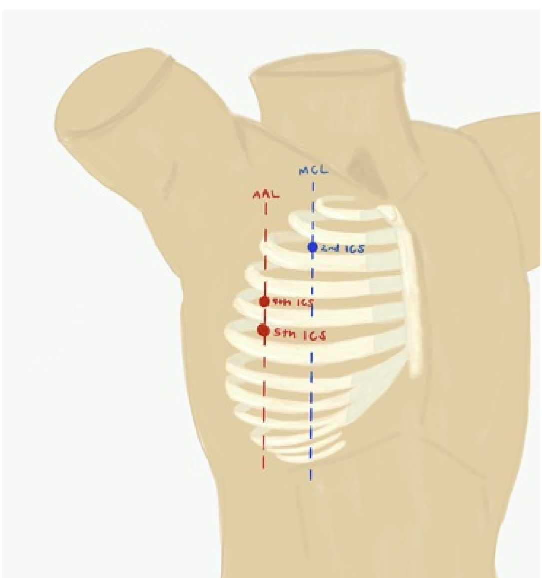
- ACP and higher

Indications

- Needle thoracentesis is indicated for the decompression of tension pneumothorax with deteriorating vital signs indicating markedly decreased cardiac output, profound shock, or cardiac arrest. Bilateral decompression is also indicated in cases of blunt traumatic cardiac arrest.

Procedure

1. Identify the insertion sites. The preferred site is the fifth intercostal space on the mid-axillary line (in the diagram, this is the red line incorrectly labelled “AAL”). An alternative placement is the second intercostal space on the mid-clavicular line. The ARS needles used by BCEHS will be effective at either site.
2. Prepare the skin by cleaning it with an alcohol swab.
3. Remove the ARS needle and catheter from its protective case. Puncture the skin, directing the needle above the inferior rib (blood vessels and nerves underlie the inferior border of each rib). Air may be heard hissing as the needle passes into the pleural space.
4. Advance the catheter into the pleural space and remove the needle.
5. Leave the catheter open to air. It is not necessary to place a chest seal over the catheter



PR22: Surgical Airways

Mike Sugimoto

Applicable To

ACP and higher

Introduction

A surgical airway is indicated in a patient who cannot be oxygenated or ventilated through other means. Paramedics may also consider preparing for surgical airways based on predicted clinical course, or in cases where endotracheal intubation is required and predicted to be difficult.

In patients over the age of 8, the bougie-assisted cricothyromtomy is the preferred approach. In patients under 8, needle cricothyrotomy can be used.

These procedures can be intimidating. Paramedics should have a thorough understanding of the circumstances under which they may be required and have a low threshold for their use. They can also be logistically challenging and frequently require more space (and personnel) than anticipated. In most cases, paramedics will want to approach a surgical airway with their non-dominant hand towards the patient's head.

Indications

- Inability to ventilate, oxygenate, or intubate a patient

Contraindications

- ABSOLUTE: INABILITY TO IDENTIFY LANDMARKS OR AIRWAY STRUCTURES
- Relative: trauma to the neck
- Relative: history of perithyroid tumors or radiation to the neck
- Relative: expanding hematomas or other pathologies distorting structures in the neck

Procedure

Procedure: Bougie-Assisted Cricothyrotomy

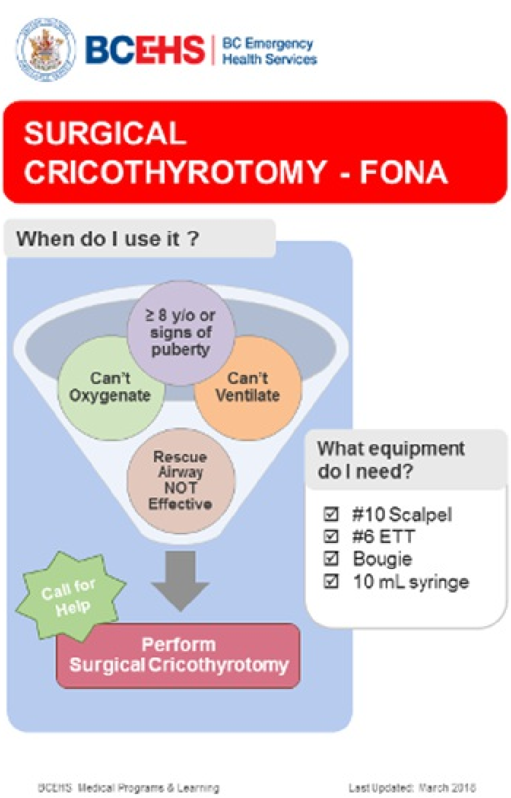
1. Personal protective equipment is required for this procedure. Face shields are critically important: upon puncturing the cricothyroid membrane, a spray of blood is frequently produced.
2. Assemble required equipment: scalpel blade, bougie, and 6.0 ETT.
3. Identify the landmarks as required.
4. Stabilize the thyroid cartilage with the non-dominant hand. The dominant hand will hold the scalpel and rest on the patient's sternum for stability.
5. Make a 4 cm vertical incision through the skin over the cricothyroid membrane. In cases where the anatomy cannot be palpated or identified prior to making the incision, it may be necessary to extend the incision from the mandible to the sternum.
6. Palpate the cricothyroid membrane and bluntly dissect through the subcutaneous tissue using a finger until the membrane is readily identifiable. Puncture the membrane with the scalpel held horizontally.
7. Remove the scalpel and place a little finger in the incision in the membrane to dilate and to identify the posterior wall cartilage. Ignore any bleeding at this point.
8. Slide the bougie alongside the little finger into the trachea.
9. Remove the finger and pass the endotracheal tube over the bougie and into the trachea. Only advance the endotracheal tube until the balloon is within the airway and no longer visible. Inflate the balloon.
10. Holding the endotracheal tube firmly, remove the bougie and connect a bag-valve mask. Confirm endotracheal tube placement with end-tidal CO_2 monitoring, auscultation, bilateral chest rise and fall, and misting of the tube.

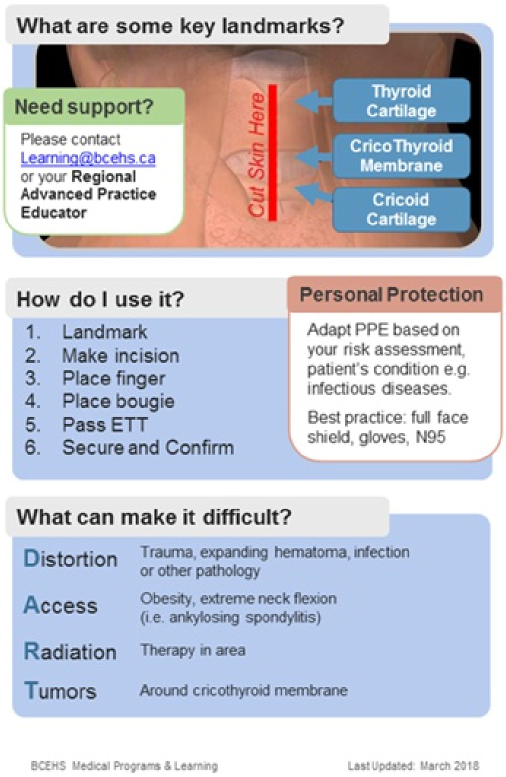
Procedure: Needle Cricothyrotomy

Children under the age of 8 should not have open cricothyrotomies as there is an unacceptable risk of causing damage to poorly-developed structures in the airway. Needle cricothyrotomy is an option in these cases. Paramedics must remember this procedure is a bridge to definitive airway management: it is possible, using this technique, to oxygenate (but not ventilate) a patient for a brief period of time, typically 15 to 20 minutes.

1. Assemble required equipment:
    - 14-gauge Angiocath; remove flash cap
    - 10 mL syringe
    - Number 3 endotracheal tube; remove the universal connector from the endotracheal tube
2. Identify landmarks: the cricothyroid membrane in children is located in the same position as adults and should be palpable through the skin below the thyroid cartilage.
3. Attach 10 mL syringe to 14-gauge Angiocath. Hold the syringe in the dominant hand, which is stabilized on the patient's mandible.
4. Puncture the skin over the cricothyroid membrane. Once through the skin, direct the needle tip caudally. At the same time, gradually retract the plunger on the 10 mL syringe until the plunger retracts freely, signaling entry into the trachea. Remove the plunger.
5. Advance the needle slightly, then withdraw the needle while threading the catheter into the trachea.
6. Insert the size 3 endotracheal tube connector in the catheter.
7. Secure the catheter and endotracheal tube connector with an occlusive dressing (e.g., Tegaderm). Form a hole in the occlusive dressing for the endotracheal tube connector.
8. Connect a bag-valve mask attached to high-flow oxygen.
9. Ventilate, being aware that higher pressures may be required and that chest rise may not be seen. The pressure relief valve will likely need to be locked down.

Notes





What are some key landmarks?

Need support?

Please contact Learning@bcehs.ca or your **Regional Advanced Practice Educator**

How do I use it?

1. Landmark
2. Make incision
3. Place finger
4. Place bougie
5. Pass ETT
6. Secure and Confirm

Personal Protection

Adapt PPE based on your risk assessment, patient's condition e.g. infectious diseases.

Best practice: full face shield, gloves, N95

What can make it difficult?

Distortion	Trauma, expanding hematoma, infection or other pathology
Access	Obesity, extreme neck flexion (i.e. ankylosing spondylitis)
Radiation	Therapy in area
Tumors	Around cricothyroid membrane

BCEHS Medical Programs & Learning Last Updated: March 2018

Resources

PR23: Awake Intubation

Mike Sugimoto

Applicable To

ACP and higher

Introduction

Awake intubation is a tracheal intubation technique that uses topical anesthesia to blunt airway reflexes, coupled with small doses of intravenous anesthetic for sedation. Patients undergoing an awake intubation are not necessarily fully "awake"; the technique refers to the limited use of sedation or induction to achieve optimal intubating conditions.

Indications

- Paramedics should consider the use of awake intubation as a primary intubation technique when doubt exists as to the ability to successfully intubate a patient while protecting the patient's intrinsic respiratory drive and gas exchange physiology; these scenarios can be broken into two broad categories:

1. Patients with predicted difficult airway anatomy. These are based either on normal variations or pathological changes in airway structures.
2. Predicted difficult physiology. Hemodynamic instability (or an inability to obtain hemodynamic stability) may not allow for the use of induction agents at full dose. Patients may also have a physiological need for high minute ventilation and may not tolerate even brief interruptions to their respiratory activity.

Contraindications

- Awake intubation is relatively contraindicated in patients who require emergent airway management as it can be a time-consuming procedure
- Patients who are actively or passively uncooperative may not benefit from an awake approach and, where possible, should be managed using other techniques

Procedure

Awake intubation is a relatively complex procedure. This procedure summarizes the steps required for awake intubation, but paramedics should not rely solely on this information for education and training in this technique.

1. Provide appropriate supplemental oxygen during application of topical anesthesia. Ensure appropriate monitoring is attached to the patient and that all vascular access devices are flowing properly.
2. Explain the rationale for the procedure to the patient. Provide information on what can be expected during the procedure; patient cooperation during the topicalization phase of the procedure results in improved intubating conditions.
3. Have the patient stick their tongue out and begin applying topical anesthesia to airway structures. The soft palate, posterior pharynx, and tonsillar pillars should be anesthetized using a "spray as you go" approach. Consider the judicious use of sedation during this phase, respecting physiological limitations.
    - When using direct laryngoscopy, additional local anesthetic can be applied to distal structures as they are exposed by the blade.
4. Using precision laryngoscopy techniques, slowly advance the blade of the laryngoscope until it is in position.
5. Intubate the patient.
6. Confirm tube placement using traditional and proven techniques.
7. Administer additional sedation as required for patient comfort based upon clinical condition and hemodynamic status.

Resources

Awake airway management and flexible endoscopic intubation, by J. Adam Law, Ian Morris, and George Kovacs.

References

Morris IR, Law JA. How to do awake tracheal intubations -- oral and nasal. In: Kovacs G, Law JA, editors. *Airway management in emergencies*. 2nd ed. Shelton: People's Medical Publishing House USA; c2011. p. 181-208.

PR24: Subcutaneous Butterfly Placement

Michelle Haig

Applicable To

- ACP and higher

Introduction

To provide guidelines to paramedics for the establishment of a subcutaneous (SQ) injection site and for the safe, accurate, and intermittent administration of medications via a subcutaneous injection site to the palliative care population for pain and symptom management when other routes are not possible or established.

Procedure

1. CliniCall consultation required prior to establishing a SQ butterfly and prior to administering medications via a SQ line.
2. Gather required equipment, perform hand hygiene, and don clean gloves.
3. Select the SQ site.
   - Note: site must be changed every seven days to maintain patency and sites must be rotated to avoid tissue damage
4. Cleanse site (circular area 5-8 cm) with chlorhexidine/alcohol swab; allow to dry.
5. Remove slide clamp from the SQ butterfly if preferred as clamp is not required after insertion.
6. Remove the vent plug and attach a needleless connector/LuerLock to the side Y port.
7. Prime the set with medication (additional 0.4 mL for priming the set, including the LuerLock).
8. Rotate the white safety shield 360º to loosen the needle. Ensure the bevel is up and catheter is not extended over the needle tip/bevel.
9. Pinch the textured yellow wings together, textured side down.
10. Gently pinch the skin fold and insert the needle at a 30-45 degree angle to the full length of the needle.
11. Hold the wings flat on the skin firmly (do not hold the centre bar). Pull back on the white safety shield in a straight continuous motion until the safety shield separates, leaving the cap.
12. Apply an Opsite sterile transparent dressing. Loop the extension set and secure in place.
    - Optional: place gauze under the port to protect the skin from pressure
13. Label the dressing:
    - Name of medication and concentration
    - Date and time of insertion
    - Administrator initials
    - Administrator clinical designation
14. Record insertion on ePCR with the following:
    - Date and time; drug; concentration; dose; route
    - Injection site and catheter size
    - Site assessment
    - Patient's response to procedure, any patient/family education, or any other pertinent actions or observations
    - Individual who inserted the catheter and administered the medication

Notes

General Directives:

- Do NOT flush tubing (medication remaining in tubing will be given during the next administration).
- CliniCall consultation required prior to establishing a SQ butterfly and prior to administering medications via a SQ line.
- The site should be assessed for redness, bruising, swelling, tenderness, leakage, or discharge. Re-site if any of these are present.
- The SQ site is to be changed every seven days or sooner to maintain patency. If two sites are being used, then two separate locations should be used (rotate sites).

- To help optimize medication absorption and patient comfort, the maximum amount of medication to be administered at one time/site is 2 mL. If greater volume is required, two sites can be used to deliver the required amount. A minimum of 30 minutes must be adhered to between doses at the same site.
- Note: more than one SQ site is required for multiple medications.
- Sites for catheter insertion are to be rotated to avoid tissue damage.
- If blood appears in the tubing, remove and discard the SQ set and select a new injection site.

Equipment & Materials

- #24 gauge butterfly needle
- Chlorhexidine 2% or 70% isopropyl alcohol swab
- Transparent dressing (e.g., Opsite or Tegaderm)
- Tape
- Non sterile gloves, latex free
- Needleless butterfly syringe with LuerLock containing the medication dose ordered, plus an additional 0.4 mL of the medication for priming the needle and tubing set at the time of initial dose administration
  - Volume may be different if using product other than Saf-T-Intima or Baxter One-Link Needle-free IV connector

Preferred Injection Sites

- Upper arms
- Abdomen
- Anterior aspect of thighs
- Above scapula
- Subclavicular chest wall

Note: site should be easily accessible; free of lesions; clear from large vessels, joints, and bones; and away from edematous tissue that may alter medication absorption.

References

Provincial Health Services Authority (2013). BC Cancer Agency: Intermittent and Continuous medication administration via an established Subcutaneous Injection Site.

Provincial Health Services Authority (2009). BC Children's Hospital Child and Youth Health Policy and Procedure manual: Continuous Subcutaneous Medication or Fluid Infusion.

PR26: Venipuncture - Ethical Decision Making

Ross Chute

Applicable To

PCP and higher

Introduction

Initiating out-of-hospital intravenous (IV) access, "just in case it is needed in hospital," is not a justifiable reason.

When should paramedics initiate peripheral IV access? What questions do we need to ask ourselves to help us make an ethical and clinical appropriate decision?

The criteria can be found in the BCEHS Ethics Framework Manual. Paramedics can also utilize the "JAY" tool to evaluate the risk versus benefit of out-of-hospital IV access.

Indications

The clinical requirements for out-of-hospital IV access:

1. To provide a saline bolus to treat hypotension, severe dehydration, or shock; to keep vein open (TKVO) is not generally a reasonable requirement
2. As a route to provide IV medication bolus administration (e.g., dimenhydrinate)
3. As a route to provide an IV infusion of medications (e.g., 10% dextrose or TXA)
4. As directed by Clinical Practice Guidelines (e.g., FAST-VAN positive patients)
5. For PCPs, in preparation for on-scene or en route rendezvous of ACPs or CCPs when it is expected that IV medications will be administered (e.g., epinephrine for cardiac arrest)

Additional considerations for PCP intraosseous cannulation:

- The tibial site is the only site approved for PCP use. PCPs are limited to two collective attempts per patient only. Do not attempt to re-cannulate a site that has failed or been dislodged.
- IOs **may** be placed under **direct** supervision by ACPs or higher. The ACP (or higher) remains responsible for any anesthesia or pain management requirements.
- PCPs may place intraosseous devices in patients **in cardiac arrest** where there is a **clear clinical history of intravascular volume depletion from a non-traumatic source**, where fluid administration is a critical component of the resuscitation plan. CliniCall must be consulted prior to placement of an intraosseous device.

Procedure

Ethical Decisions: Establishing Out-of-Hospital Intravenous Access

When consolidating the care plan, paramedics should consider:

1. Does the patient require IV access for treatments within the out-of-hospital care plan?
   Yes. For reasons of fluid administration, medication administration, or CPG requirement.
   No. Then don't attempt an IV in the field.

2. Why am I initiating this IV start?
   - For patient care that requires fluid administration, medication administration, or CPG direction – (Apply the JAY tool)
     - JUSTIFIABLE:
       - The patient is hypovolemic, severely dehydrated, in shock, and requires fluid administration.
       - The patient is actively vomiting and requires dimenhydrinate.
       - The patient has significant blunt or penetrating trauma and requires TXA.
       - The patient is hypoglycemic and requires IV dextrose.
     - ACCOUNTABLE:
       - This procedure will benefit the patient and my peers would offer the same or similar care to this patient.

        - YOU:
            - If I were the patient, I would appreciate the benefit of fluid replacement and the relief the medication offers for my dignity and comfort.

    - Skill maintenance or learning purposes – (Apply the JAY tool)
        - JUSTIFIABLE:
            - Skill maintenance would not be defendable in an adverse patient event.
            - Out-of-hospital IV access increases the patient's risk to harm due to preventable infection and potential for embolism or thrombosis.
            - Did you inform the patient of the reason(s) and the risks associated with the IV start? (Informed consent for skill maintenance or learning only purposes.)
            - Did you ask the patient for permission to start the IV?
        - ACCOUNTABLE:
            - Practicing skills on patients are poor arguments for skill maintenance or learning. We don't practice chest compressions on a patient that has a pulse. We have simulators available for skill maintenance purposes.
        - YOU:
            - Would you want an unnecessary IV insertion if you didn't require one? Knowing the evidence of infection rates, increased ED stays, and other complications of out-of-hospital IV access, I would want to avoid this risk.

    - The hospital might need an IV – (Apply the JAY tool)
        - JUSTIFIABLE:
            - There is no written direction from clinical and medical programs or the receiving hospital to have an out-of-hospital IV in place.
        - ACCOUNTABLE:
            - The practitioner who places the out-of-hospital IV catheter is responsible for any adverse events that may happen if treatment is not justifiable.
        - YOU:
            - If I were the patient, and knowing the evidence, I would not want an out-of-hospital IV insertion done if the paramedic was not going to utilize it.

Notes

The risks or adverse events which can occur with out-of-hospital IV access include:

- Pain/anxiety
- Infection
- Infiltration
- Hematoma
- Air embolism
- Catheter tip or thromboembolism
- Phlebitis

Resources

1. BC Emergency Health Services. BCEHS Ethics Framework Manual. [Link]
2. BC Emergency Health Services. JAY Tool. [Link]

PR27: iGel Pharyngeal Suctioning

Applicable To

PCP and higher

Introduction

The seal of an iGel supraglottic airway may be affected by passive gastric secretions or the undetected accumulation of emesis during resuscitation. Because PCPs are not authorized to perform gastric intubation, a modified approach is required to provide on-going suctioning of the pharynx to ensure an effective seal.

Indications

- Significant suctioning of emesis or gastric secretions was required prior to iGel placement
- Known or suspected presence of gastric secretions following placement of iGel
- Persistent difficult ventilation despite best efforts to manipulate the iGel

Contraindications

- Active vomiting with iGel in place, or difficulty in ventilating following an episode of active vomiting; the iGel should be removed in these cases; suction the oropharynx and replace the device as required

Procedure

1. Ensure the iGel is appropriately sized and inserted in accordance with PR08: Supraglottic Airway.
2. Secure the iGel using the included neoprene strap.
3. Unravel the suction catheter included with the Resus Pack, ensuring there are no significant kinks.
4. Using the flat (label) side of the clear plastic outer iGel as a measuring guide, straighten the suction catheter and measure along the length of the package with the distal tip of the suction catheter on one edge.
5. Add approximately 2 cm to this length and apply tape around the suction catheter to mark the depth.
6. Apply lubricant (Muko gel) over the proximal end of the gastric channel of the iGel.
7. Insert the suction catheter through the lubricant and into the gastric channel of the iGel until the taped depth indicator reaches the outer edge of the channel. Do not advance any further.
8. Attach the suction catheter to the suction tubing using the connector.
9. Apply suction and watch for the presence of fluid.
10. Once fluid has been cleared, or if no fluid appears after 15-20 seconds, turn the suction unit off (but leave the tubing attached). Continuous suction is not appropriate and may be harmful.
11. If additional secretions are suspected, or the iGel seal becomes impaired, repeat suction as required.

Caution:

- Ensure the airway is appropriately decontaminated prior to placing the iGel.
- Consider other causes of difficult ventilation (e.g., improper device size, incorrect depth, lack of posterior/inferior pressure, or airway obstruction) prior to attempting pharyngeal suctioning.
- If the iGel becomes dislodged with a suction catheter in place, do not attempt to re-insert the iGel with the suction catheter beyond the distal tip of the iGel.
- Suction should be applied at 80 mmHg and not generally exceed 160 mmHg.

Resources

PR28: Modified Valsalva

Applicable To

ACP and higher

Introduction

The Valsalva manoeuvre should be the first line of treatment for the management of narrow complex supraventricular tachycardia (SVT) in the hemodynamically stable patient. Although there are other vagal stimulation methods available, the Valsalva is the safest and most effective technique for terminating SVT of an unknown mechanism.

The modified Valsalva manoeuvre, with supine repositioning and legs elevated, has been shown to be significantly more likely to restore sinus rhythm than the standard Valsalva manoeuvre. It should be performed over the standard Valsalva whenever possible, given the greater likelihood of success.

Indications

- Hemodynamically stable supraventricular tachycardia (SVT)

Contraindications

- Requirement for immediate cardioversion (hemodynamic instability)
- Hypotension (SBP < 90 mmHG)
- Atrial fibrillation/flutter
- Aortic Stenosis
- Recent myocardial infarction (within 3 months)
- Glaucoma
- Retinopathy
- Third trimester of pregnancy

Procedure

1. Obtain a baseline 12-lead ECG.
2. Explain the procedure to the patient.
3. Position the patient in a semi-recumbent position.
4. Press print on the cardiac monitor.
5. Instruct the patient to perform a forced expiration into a sterile 10 mL syringe for 15 seconds.
6. At the end of the forced expiration, remove the syringe and lay the patient supine with the legs raised straight to 45° for 15 seconds.
7. Reposition the patient to a semi-recumbent position for 45 seconds.
8. Stop printing the on the cardiac monitor once cardioversion is achieved or 45 seconds has elapsed.
9. Repeat 12-lead ECG if cardioversion was achieved.
10. If the procedure was not successful and the SVT has failed to revert, consider repeating the procedure to a maximum of 3 attempts.
    - If repeated attempts are required, ensure the patient has returned to a hemodynamically stable presentation prior to repeating

Notes

- Patients taking beta blockers often demonstrate a blunter blood pressure response to the Valsalva manouevre.

Resources

References

1. Appelboam A, et al. Postural modification to the standard Valsalva manoeuvre for emergency treatment of supraventricular tachycardias (REVERT): A randomised controlled trial. 2015. [Link]
2. Page RL, et al. 2015 ACC/AHA/HRS Guideline for the management of adult patients with supraventricular tachycardia. 2015. [Link]
3. Queensland Ambulance Service. Clinical practice procedures: Cardiac/modified Valsalva manoeuvre. 2017. [Link]

PR29: Mechanical Ventilation

Applicable To

CCP only

Introduction

Patients in out-of-hospital settings may benefit from mechanical ventilation. In cases where mechanical ventilation represents a component of a treatment plan (such as hypoxemic respiratory failure secondary to pneumonia), it should be initiated as early as practicable. For other patients requiring mechanical support, the use of a ventilator provides consistent ventilation, allows close monitoring of ventilatory parameters, and frees paramedics from the need to ventilate by hand.

Despite these benefits, patients with time-dependent emergencies, such as traumatic injuries, should not have their conveyance delayed. Paramedics must make the decision to initiate mechanical ventilation based on clinical presentation, anticipated complications, and logistical factors (including availability of assistance and conveyance time).

Procedure

General approach

1. Determine type of ventilator (LTV 1000 / LTV 1200, Hamilton T1).
    - PEEP compensated
    - Non-PEEP compensated
2. Connect power source.
3. Assemble ventilator circuit:
    - Circuit
    - E_tCO_2 detector
    - HME filter
    - Tracheal suction
4. Perform initial checks:
    - Start up
    - Leak test

Basic approach to ventilation

1. Select Assist Control -- Volume or (S)CMV+.
2. Select tidal volume (V_T) of 6-8 mL/kg.
    - May select higher volumes in patients without lung injury as required
    - Monitor for elevated Pplats (> 30 cmH_2O)
3. Set respiratory rate:
    - Rate and V_T must provide a minute volume (V_E) that adequately meets the patient's metabolic demands unless a permissive hypercapnia strategy is being used
    - Monitor for presence of auto-PEEP
4. Set desired FiO_2:
    - For patients with any degree of hypoxia, an initial FiO_2 of 1.0 is appropriate
    - FiO_2 should be titrated down as soon as practical, assuming adequate oxygenation can be maintained in the context of the patient's condition and metabolic demands
5. Set desired PEEP:
    - Set initial PEEP with consideration of the physiological context; 5-10 cmH_2O is appropriate for most patients
    - Hypoxemic patients will likely require higher levels of PEEP; titrate as required
    - Ensure plateau pressures (P_{plat}) are ≤ 30 cmH_2O
6. Set inspiratory time (T_i):
    - Adjust T_i for flows (V_{calc}) of 40-60 liters/minute

7. Set sensitivity to allow for patient-triggered breaths, if desired.
8. Set appropriate initial alarm parameters:
    - High pressure limit: 10 cmH_2O above current peak inspiratory pressure (PIP)
    - Low pressure: 5 cmH_2O above set PEEP
    - Low minute volume: 10-20% below set minute volume
    - Monitor the patient's vital signs including SpO_2, $EtCO_2$, vital signs, arterial blood gas, and P_{plat} and adjust ventilator settings appropriately
9. In case of refractory hypoxia, consider:
    - Increasing PEEP and FiO_2, with due consideration of trans-pulmonary pressures and/or P_{plat}
    - Performing a recruitment maneuver if indicated (e.g., inspiratory hold at 40 cmH_2O for 40 seconds); use caution in cases of hemodynamic compromise
    - Adjusting mode of ventilation
    - Switching to pressure control ventilation
        - If changing to pressure control, monitor for auto-PEEP and adjust alarm parameters to appropriate settings:
            - High pressure limit: 10 cmH_2O above set total pressure
            - Low pressure: 5 cmH_2O above set PEEP
            - Low minute volume: 10-20% below actual minute volume
    - Increasing T_i
    - Inserting an esophageal balloon
    - Using inverse-ratio ventilation (IRV)

PR31: Mechanical CPR Devices

Applicable To

ACP and above

Introduction

Mechanical CPR devices (e.g. LUCAS) are being used by select ACP, CCP, and Paramedic Specialist crews for medical cardiac arrests.

Indications

Mechanical CPR devices may be used for **medical (e.g. non-traumatic)** cardiac arrests in the following circumstances:

- To ensure the safety of crews when conveying patients with CPR in progress in a moving motor vehicle or aircraft
- As part of an approved clinical trial (e.g. ECPR trial)
- In transfers with appropriately trained medical teams
- Search & rescue or retrieval/conveyance purposes
- If the device is already in place after being applied by an appropriately trained person (e.g., select first responders, Canadian Coast Guard, search and rescue, Canadian Armed Forces, etc.)
- The device may be left in place if the appropriately trained person is able to travel with the patient to hospital; if this is not possible, the device should be removed and manual CPR commenced for conveyance

Contraindications

- **Mechanical CPR devices are NOT indicated for patients in traumatic cardiac arrest**
  - Patients in traumatic cardiac arrest should receive manual CPR in addition to other interventions as required for the patient's clinical situation; priority in these situations is expedited conveyance if the patient meets criteria for continuation
- Patient is too small: the suction cup is not being completely compressed when it is lowered
- Patient is too large: the support legs of the device cannot be locked into place without compressing the patient

Procedure

Assembly and Application of the LUCAS CPR Device:

1. Start manual compressions while another provider unpacks the LUCAS device. Press and hold 'ON/OFF' button on the user panel for one second. The device will perform a self-test.
2. Cease chest compressions to apply the back plate. As a team, lift the patient's upper body and lay the back plate below the armpits. If the upper portion of the device is not immediately available, resume compressions until the upper portion is ready.
3. Resume manual chest compressions (continue them through steps 4 and 5).
4. Place the upper portion of the LUCAS over the patient's chest so that the claw locks of the support legs can engage the back plate. Ensure that the patient's arms are outside the device.
5. Engage one support leg at a time starting with the closest one. **Confirm that both support legs are locked.**
6. Using two fingers, lower the suction cup until the pressure pad inside the cup touches the patient's chest. The lower end of the suction cup should be just above the xiphoid process.
7. Push 'PAUSE' (position 2) to lock the start position.
8. To start compressions, push 'ACTIVE' (30:2) (Position 3). Confirm that the device is working properly and check for central pulses upon compression.
9. To stop chest compressions, push 'PAUSE' (position 2).

Attaching the Stabilization Strap:

1. Lift the patient’s head and place the support cushion under the patient’s neck as close to the shoulders as possible.
2. Ensure that both device straps have been secured to the LUCAS support legs.
3. Tighten the buckles on the support cushion strap as required.
4. Ensure that the device remains properly positioned.

Cleaning After Use:

1. Clean all outer surfaces of the device, backboard, and neck strap with Accel disinfectant wipes. Be sure to clean the claw locks as well. Ensure a wet-contact time of 3 minutes.
2. Suction cup: unless grossly contaminated, continue with standard cleaning procedure above and put back in LUCAS bag for re-use.
3. Allow the device and accessories to dry before packing back into the bag.

Notes

Patients with traumatic cardiac arrest often have a cause of their arrest that does not respond to CPR (e.g., blood loss, tension pneumothorax, cardiac tamponade, etc.). Mechanical CPR devices take time to remove and can delay critical time-sensitive interventions on arrival to the emergency department (e.g., chest tube insertion, thoracotomy). This has been recently re-emphasized by trauma surgeons representing Trauma Services BC.

Priority for patients in traumatic out-of-hospital cardiac arrest is prompt conveyance to the nearest trauma centre if the patient meets criteria for continuation of resuscitation. Do not use mechanical CPR devices for these patients.

Resources

PR32: Vascular Compression Band

Applicable To

EMR and above

Introduction

The Vascular Compression Band (VCB) is a device designed to obtain hemostasis of the radial artery post trans-radial cardiac angiography. The device uses an inflatable cushion that sits over the puncture site compressing the radial artery but allowing the ulna artery to supply blood to the hand. A syringe is used to add and remove air.

Assessing the patient is key.

Procedure

Assessment with Band On

1. Check baseline vital signs
2. Conduct site check every 15 minutes ensuring to assess circulation:
   - Capillary refill (< 2 seconds)
   - Pain/tingling/numbness
   - Coolness and/or colour change
   - Bleeding, swelling, hematoma at site
   - O_2 saturation of the affected thumb
3. Document hematoma if present
4. Ensure proper time frame to start removal process

Pre-Removal Assessment

- Note band application time
- Look for band release start time on the post procedure form
- Note how many mLs of air was at starting point
- The usual amount is 15 mL and the maximum amount of air is 18 mL

Band Removal

Use the syringe provided with the band

1. Insert syringe tip into the band inflator (air port)
2. Ensure the syringe is in the 2 mL deflation position
3. Remove 2 mL of air from the inflation balloon every 15 minutes via air port
4. Re-assess site for bleeding and hematoma after each deflation

Repeat steps 1 to 4 until all the air is removed from the band

If there is no bleeding:

1. Remove the band from the patient's wrist
2. Apply Tegaderm dressing

If at any time during the deflation process bleeding occurs, stop the process and re-inflate with the same amount that was removed. This will usually achieve hemostasis.

After the Band Has Been Removed

1. Assess site for hematoma or bleeding
2. Capillary refill (< 2 seconds)
3. Coolness and/or colour change
4. O_2 saturation of the affected thumb
5. Continue the scheduled site checks
6. Check every 15 minutes or if hand is used in any way

Conveyance guidelines

- Patient position - of comfort
- Arm position - of comfort; patient is not to use hand
- Wrist movement restrictions - no flexion, extension, or pressure
- IV - in situ and patent (max 500 mL bag attached to patient)
- SpO_2 - on while the band is on the patient

Notes

Complications

Bleeding

If bleeding occurs while the band is on, remove the band and apply direct pressure just proximal to the access site for 10 minutes using a gloved hand. Once hemostasis is achieved, continue with site checks.

- If the site continues to bleed after 10 minutes, continue direct pressure and take the patient to the closest hospital
- **DO NOT RE-APPLY THE BAND**

If bleeding occurs at any time during the deflation process, inject enough air to restore hemostasis (never inflate VCD beyond 18 mL). Wait 30 minutes and then repeat Step 1 of the removal protocol (4.2). Restart scheduled site checks every 15 minutes.

- Document
- Notify receiving hospital

Hematoma

If a hematoma occurs while the band is on:

1. Remove the VC band and apply direct pressure just proximal to the access site for 10 minutes
2. Outline perimeter
3. Refer back to hematoma chart (use the legend on the RCCL document)
4. Restart site checks
5. Document
6. Notify receiving hospital

Neurovascular Compromise

If patient presents the following:

- Capillary refill prolonged (> 2 seconds)
- Cool, pale, or discoloured limb
- Pain/tingling

1. Remove 1 mL of air via band air port
2. Monitor for improvement
   - With improvement: continue site checks as per schedule

   - With NO improvement: convey patient to the closest hospital
3. Document
4. Notify receiving hospital

Resources

References

1. Kern, M. et al. The Cardiac Catheterization Handbook (6th ed). 2016.
2. Vascular Solutions Inc. VASC™ Band Hemostat [Product Reference Sheet]. [Link]

Changelog:

- 2023-06-13: enabled VCB for EMR scope of practice

PR33: PCP LifePak 15 IFT Procedure

Applicable To

PCP and above

Introduction

To provide clear guidelines for the Primary Care Paramedic (PCP) inter-facility transport (IFT) of stable patients requiring electrocardiogram (ECG) monitoring.

Indications

All of the following criteria must be met prior to the initiation of transport:

- Patients must have been pre-screened by EPOS or Critical Care Paramedic Advisor (CCP-A) for appropriateness of transport
- No current or ongoing chest pain
- SpO2 > 92%
- Systolic blood pressure > 90 mmHg
- Glasgow Coma Scale 15/15

CliniCall consultation required to confirm transport in the following circumstances:

- Heart rate < 50 or > 100 beats/minute
- Recent cardiac dysrhythmias within six hours of transport
- Recent cardiac chest pain within three hours of transport
- Recent thrombolysis within three hours of transport

Procedure

1. Assess the patient for indications.
2. Complete a full assessment including:
    - Full patient history
    - Complete physical exam
    - Vital signs
    - Baseline ECG
3. Indications met with EPOS/CCP-A approval:
    1. Continue with monitoring
    2. Confirm transport logistics of transfer
    3. Load and transport patient
4. Change in patient condition during transport:
    - If the patient becomes unstable during transport:
        - Unresponsive or decreased LOC
        - Seizures
        - Hypotension
        - Cardiac chest pain
        - Severe shortness of breath with dyspnea
    - Contact CliniCall/CCP-A for consultation
    - If closer to hospital, transport directly to the hospital and notify dispatch of the change in patient status.
    - If closer to an arriving critical care transport team, notify team and continue meet.

Notes

See also: LifePak 15 Primary Care Paramedic Standard Operating Procedure

Resources

For clinical support please contact Clinicall (1-833-829-4099)

For additional information contact your regional Paramedic Practice Educator (PPEd)

PR34: Transvenous Pacing

Brian Reichert

Applicable To

CCP only

Introduction

Transvenous pacing is a temporary method of endocardial pacing via central venous access. Although an invasive procedure, it is more comfortable than transcutaneous pacing and the wires are less prone to displacement during conveyance.

Indications

- Maintain transvenous pacing if initiated at the sending facility
- Life-saving treatment for bradyarrhythmias unresponsive to medications, with symptoms or severe hemodynamic impairment
- Prolonged conveyance given the risks of sedation for patients being transcutaneously paced where the risks outweigh those of transvenous pacing

Contraindications

- Bradycardia that is well-tolerated
- Myocardial infarction being treated with a thrombolytic agent and is being aggressively treated with anticoagulant or antiplatelet agents
- Inability to maintain cardiac monitoring
- Prosthetic tricuspid valve
- Severe hypothermia

Exercise caution in patients whose bradycardia is associated with correctable causes.

Procedure

1. The CVC, either internal jugular or subclavian, with a cordis is in situ.
2. The pacing wires have been sheathed, floated, and placed.
3. The sending facility has initiated the transvenous pacing.
4. TVP settings:
   - Most modern generators have a locking mechanism to reduce the risk of accidental changes. This is usually a button that looks like a key or a lock -- unlock this to change pacing settings.
   - Set the rate to maintain an appropriate cardiac output for the patient's needs.
   - There are two methods of setting current (measured in mA) to establish capture:
     - Start at 10-20 mA and decrease the current until capture is lost, then increase by 1 mA increments to maintain capture.
     - Set the output at 2 to 3 times the pacing threshold.
   - Sensing is measured in mV. If the patient has no intrinsic rate, the sensitivity is turned to the least sensitive value. If the patient has intrinsic activity, set the sensitivity to allow for normal beats to be sensed and pacing to be inhibited. The sensitivity setting on the generator is decreased to allow for a greater sensitivity threshold (and vice versa).
5. Ensure fluid is running through the cordis appropriately.
6. Gather the appropriate equipment:
   - Generator
   - Spare batteries
   - Pacing wires

    - Return address of the sending hospital
7. Ensure the locking mechanism of closed and mark the depth of the wires.
8. Ensure the pacemaker has electrical and mechanical capture.

Example of pacemaker generator:

Notes

Troubleshooting:

- Check the rate
- Check for capture:
    - Generator failure
    - Displaced or broken wire
    - Battery failure
    - Underlying clinical condition
- Check pacing:
    - Current (mA)
    - Sensitivity (mV)
    - Battery
    - Displaced wire
- Check sensitivity:
    - Under-sensed
    - Over-sensed
- Bleeding
- Air or pulmonary embolism
- Pneumothorax

References

1. Costello, L. Pacemaker essentials. 2016. [Link]
2. Ganz, LI. Temporary cardiac pacing. 2021. [Link]
3. Bohanske, M. Transvenous pacemaker placement. 2020. [Link]

PR35: Bladder Pressure Monitoring

Brian Reichert

Applicable To

CCP only

Introduction

Bladder pressure monitoring is used to identify an often under-recognized and under-treated cause of obstructive shock related to intra-abdominal hypertension. Intra-abdominal pressure (IAP) is graded by:

- Grade I: 12-15 mmHg
- Grade II: 16-20 mmHg
- Grade III: 21-25 mmHg
- Grade IV: > 25 mmHg

Abdominal compartment syndrome is a sustained IAP of more than 20 mmHg and is associated with new organ dysfunction. Consideration needs to be paid to a primary or secondary cause so that appropriate treatment can be initiated. Reducing the obstructive shock state allows for a safer conveyance.

Indications

- Suspected obstructive shock resulting from either a primary or secondary source of abdominal hypertension that has led to abdominal compartment syndrome

Contraindications

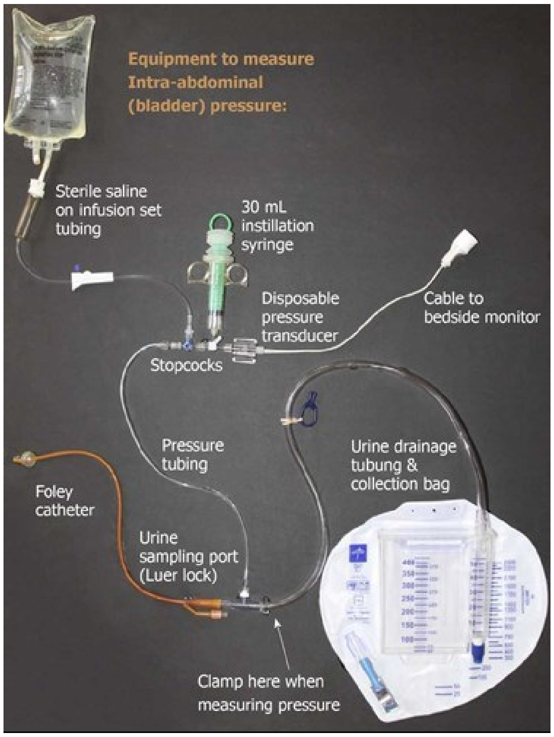
- Any patient unable to tolerate a head-of-bed < 20°

Caution: a blocked or kinked Foley will give falsely high pressures

Caution: PEEP will cause falsely high pressures

Procedure

1. Perform hand hygiene.
2. Patient should be placed in the supine position for measurement. The head of the bed needs to be < 20°. If this is not clinically feasible, it is important to recognize that elevation of the head of the bed will result in a higher IAP.
3. Document position and ensure all subsequent readings are taken in the same position.
4. Prime the pressure monitoring tubing.
5. Connect the tubing to the sampling port on the Foley tubing using aseptic technique.
6. Connect the transducer cable to the monitor.
7. Level at the cross section of the mid-axillary line and the iliac crest; zero the transducer.
8. Change the scale on the monitor to 30 mmHg.
9. Clamp the drainage tube to the urine bag below or distal to the sampling port.
10. Using the port on the tubing and the three-way stopcock, fill the bladder with 1mL/kg (minimum of 3 mL and maximum 25 ml) of 0.9% sterile sodium chloride using the syringe. The volume of fluid in the bladder should be constant for each subsequent measurement.
11. Once instilled, close the stopcock of the syringe and wait 60 seconds.
12. Obtain the mean pressure reading upon end expiration.
13. The abdominal pressure should produce fluctuations in the waveform.
14. Once finished with the reading, re-open the clamp.



Notes

- False positives can occur with patient position, RASS, and detrusor muscle contraction.
- Some commercial products connect directly in line with the Foley tubing.

References

1. Gestring M. Abdominal compartment syndrome in adults. 2020. [Link]
2. Raccanello J., Morris K. Intra-abdominal pressure monitoring. 2020. [Link]
3. Morgan B. Information and procedure: intra-abdominal pressure monitoring. [Link]
4. Rogers WK, Garcia L. Intraabdominal hypertension, abdominal compartment syndrome, and the open abdomen. 2018. [Link]

PR36: Turkel Needle Thoracentesis

Brian Reichert

Applicable To

- ACP and higher

Introduction

Needle thoracentesis or thoracostomy is a common procedure in which any tube or small catheter is placed through the chest wall into the pleural cavity and used primarily to drain air or fluid. The Turkel device is used by ACPs and CCPs to relieve a tension pneumothorax or hemothorax.

Indications

- Tension pneumothorax or hemothorax with deteriorating vital signs, markedly decreased cardiac output, profound shock, or cardiac arrest.
- Altitude and flight physiology suggests that hemodynamic and patient deterioration may occur due to Boyle's law; the issues regarding in-flight assessment and treatment options may be limited and earlier intervention may be necessary.

Contraindications

- Needle thoracentesis increases morbidity if performed when a tension pneumothorax is suspected but absent.

Caution: (CCPs) The lack of lung sliding with ultrasound is not 100% sensitive or specific of a pneumothorax.

Procedure

1. Identify most appropriate insertion point: the 4th or 5th intercostal space in the mid-axillary line, or alternately, the 2nd intercostal space in the mid-clavicular line (MCL). Consider underlying injury when selecting a site.
2. Clean skin over the selected site.
3. Prepare the insertion site; use surgical scalpel to lacerate the skin at the site of insertion. The nick is not required but will likely aid in the insertion.
4. Hold the device between the thumb and middle finger with the index finger. Hold at the prefabricated finger hold and not at the main body or stopcock.
5. Advance the device through the chest wall until the indicator changes from red to green indicating that the tip is no longer encountering resistance. Stop advancing.
6. Advance the catheter over the needle into the pleural space and withdraw the needle assembly.
7. Additional catheters may be placed as required.
8. To relieve the pressure, open the three-way stopcock.
9. Secure, + or – a Heimlich valve as appropriate. It is not appropriate to put suction directly onto the three-way stopcock. For CCPs, if suction is required, use a Heimlich.

Notes

Children and neonates may benefit from a much smaller gauge needle to avoid lung injury and surrounding structures.

References

Huggins JT, Carr SR, Woodward GA. Thoracostomy tubes and catheters: Placement techniques and complications. 2020. [Link]

Blackwell T. Prehospital care of the adult trauma patient. 2020. [Link]

PR37: Femoral Arterial Line Placement

Brian Reichert

Applicable To

CCP only

Introduction

Direct continuous measurement with an intra-arterial catheter is the gold standard for determining arterial blood pressure and blood sampling. This allows for aiding and guiding ongoing care in real time. The most common site for insertion is the radial artery as it is easiest to access and landmark. Due to patient habitus or anatomy, a femoral approach may be necessary as an alternative.

Indications

- Identification and monitoring of acid-base disturbances
- Measurement of the partial pressures of oxygen and carbon dioxide
- Assessment of the response to therapeutic interventions
- Hemoglobin quantification and response to intervention

Contraindications

Relative:

- Local infection, thrombus, or distorted anatomy at the puncture site
- Severe peripheral vascular disease
- Supratherapeutic coagulopathy and infusion of thrombolytic agents
- INR ≥ 3
- PTT ≥ 100
- Platelet count < 50 x 10^9/L

Caution: Arterial line placement should be done for ongoing guidance of care and not a singular point of care test.

Procedure

1. Prime femoral arterial line set (with or without VAMP).
2. Normal saline run through arterial line set.
3. Remove white vented caps and replace with blue non-vented caps.
4. Apply pressure infuser at 300 mmHg.
5. Connect to monitoring cable.
6. Identify femoral artery either by palpation or with ultrasound (preferable).
7. Locate the inguinal ligament. Never allow the needle to cross the inguinal ligament.
8. If applicable, move the pannus.
9. Clean insertion site using aseptic sterile technique.
10. Full barrier precautions including mask, cap, and eye protection should be worn.
11. Position wrist/hand to allow for access to femoral artery.
12. Landmark femoral artery for catheter insertion.
13. A skin nick should be made with a scalpel to avoid a skin plug or damage to the catheter.
14. Using femoral artery line catheter, insert at 45^o angle until blood return.
15. Use included slide and guidewire to perform Seldinger technique to assist in catheter insertion. (If using a separate wire, utmost care should always be used for strict wire control.)

16. Slide catheter off hub while retracting needle (this will be an exposed sharp).
17. Secure line with suturing.
18. Apply Opsite.
19. Attach primed femoral artery line tubing.
20. Level the transducer.
21. Zero art line.
22. Turn off to patient.
23. Open line to air.
24. Zero on monitor.
25. Perform square waveform test.

Notes

- Consider the risk stratification for an invasive procedure including the time associated with insertion and the need for conveyance.
- Consider the use of venous blood samples when appropriate.
- Arterial samples are often not required if oxygenation is known to be appropriate and SpO2 levels are adequate and reliable.
- Venous blood gas samples can be adapted to determine acid-base status with the appropriate conversions (excluding a reliable PaO2).
- Hemodynamic monitoring may be accomplished with a faster, albeit less reliable, procedure (NIBP). A risk assessment should be done to determine the need.
- The femoral site is at a greater risk of infection. Diligent cleaning and sterile technique needs to be done prior to insertion.

References

1. Theodore AC, Clermont G. (2020). Intra-arterial catheterization for invasive monitoring: Indications, insertion techniques, and interpretation. [Link]
2. Theodore, AC. (2021). Venous blood gases and other alternative to arterial blood gases. [Link]
3. Theodore AC. (2020). Arterial blood gases. [Link]

PR38: Radial Arterial Line Placement

Brian Reichert

Applicable To

- CCP only

Introduction

The use of arterial lines for hemodynamic monitoring and access for blood sampling in high-risk surgical and critically ill patients has become standard practice. Thus, aiding and guiding ongoing care in real time. The most common site for insertion is the radial artery as it is easiest to access and landmark.

Indications

- Identification and monitoring of acid-base disturbances
- Measurement of the partial pressures of oxygen and carbon dioxide
- Assessment of the response to therapeutic interventions
- Hemoglobin quantification and response to intervention

Contraindications

Relative:

- Abnormal Allen's test
- Local infection, thrombus, or distorted anatomy at the puncture site
- Severe peripheral vascular disease
- Active Raynaud's syndrome

Cautions:

- Arterial line placement should be done for ongoing guidance of care and not a singular point of care test
- Supratherapeutic coagulopathy and infusion of thrombolytic agents
- INR ≥ 3
- PTT ≥ 100
- Platelet count < 50 x 109/L

Procedure

1. Prime radial arterial line set (with or without VAMP).
2. Normal saline run through arterial line set.
3. Remove white vented caps and replace with blue non-vented caps.
4. Apply pressure infuser 300 mmHg.
5. Connect to monitoring cable.
6. Identify radial artery.
7. Perform modified Allan's test to ensure adequate collateral circulation.
8. Clean insertion site using aseptic technique.
9. Position wrist/hand to allow for access to radial artery.
10. Landmark radial artery for catheter insertion.
11. Using radial artery line catheter, insert at 45^{o} angle until blood return.
12. Use included slide and guidewire to perform Seldinger technique to assist in catheter insertion.
13. Slide catheter off hub while retracting needle (this will be an exposed sharp).

14. Secure line with suturing.
15. Apply Opsite.
16. Attach primed radial artery line.
17. Level the transducer.
18. Zero art line.
19. Turn off to patient.
20. Open line to air.
21. Zero on monitor.
22. Perform square waveform test.
23. Note: In cases where radial artery access is not achievable, alternate sites (i.e., femoral) may be initiated. It is important to note that longer FA catheters must be used as standard RA ones are likely to be too short to be effective.

Notes

- Consider the risk stratification for an invasive procedure including the time associated with insertion and the need for conveyance.
- Consider the use of venous samples when appropriate.
- Arterial samples are often not required if oxygenation is known to be appropriate and SpO2 levels are adequate and reliable.
- Venous blood gas samples can be adapted to determine acid-base status with the appropriate conversions (excluding a reliable PaO2).
- Hemodynamic monitoring may be accomplished with a faster albeit less reliable procedure (NIBP). A risk assessment should be done to determine the need.

References

1. Theodore AC, Clermont G. (2020). Intra-arterial catheterization for invasive monitoring: Indications, insertion techniques, and interpretation. [Link]
2. Theodore, AC. (2021). Venous blood gases and other alternative to arterial blood gases. [Link]

PR39: Escharotomy

Brian Reichert

Applicable To

RESTRICTED TO PHYSICIAN SUPPORT ONLY

Introduction

This is limited to chest escharotomies.

Circumferential deep partial-thickness and full thickness burns involving the chest wall can lead to respiratory collapse. This is the case when the dermis becomes stiff and unyielding, leading to the restriction of wall motion during respiration. This burnt, stiff, and unyielding tissue is referred to as an eschar. A decompressive escharotomy is an extremely rare but potentially life-saving procedure to preserve respiration. Clinicians need to be mindful this is not a fasciotomy. The incision is only through the non-viable eschar allowing the cutaneous envelope to become more compliant.

Indications

- In consultation with physician support (ETP/EPOS)
- Respiratory decompensation secondary to the restrictive lung wall compliance resulting from a deep circumferential or near circumferential burn involving the chest
- Inability to ventilate due to high pressures related to a restrictive chest wall

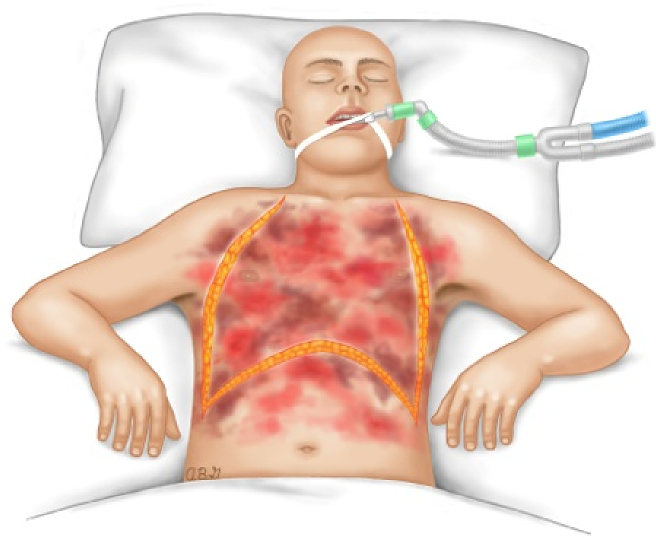
Contraindications

- No contraindications with circumferential or near-circumferential deep partial-thickness or greater burns to the torso with impending or established respiratory collapse

Caution: This is a rare but potentially life-saving event; consult with ETP/EPOS.

Procedure

1. The patient is placed in a supine position while maintaining ventilatory support efforts.
2. Time permitting – cleanse the area of any excess debris or loose clothing.
3. Utilizing a scalpel cut down through the eschar to the level of the subcutaneous fat. This depth is approximately 1 cm. An immediate release in tissue pressure is experienced often as a discernible popping sensation.
4. Using sterile technique, incise the chest wall from the clavicle to the costal margin in the anterior axillary line bilaterally; avoid breast tissue in women.
5. Once the escharotomy is performed, monitor for improvement in ventilation as evidenced by improved compliance of ventilations using a mechanical ventilator or bag/valve device, visible chest rise, and improvements in oxygen saturation.
6. If improved compliance is not seen after the initial incision, revise the escharotomy in an attempt to improve ventilatory support. Consider joining these vertical incisions with two transverse incisions. These transverse incisions connect the previous vertical incisions made above. The first is at the clavicles inferiorly and the second is superior to the abdomen at the level of the costal margin. (Sometimes referred as a Roman breastplate approach.)
7. Once completed, cover the torso/chest wall area with a sterile burn sheet.
8. Maintain continuous monitoring of the patient’s respiratory compliance and oxygenation.



Notes

- Complications include hemorrhage, increased fluid loss, subcutaneous infection, and neuromuscular injury.

References

1. Streitz MJ. How to do burn escharotomy. 2020. [Link]
2. Rice PL. Orgill DP. Emergency care of moderate and severe thermal burns in adults. 2019. [Link]
3. Phelan HA. Bernal E. Treatment of deep burns. 2019. [Link]

PR40: Foley Catheterization

Brian Reichert

Applicable To

- ACP with Schedule 2 endorsement
- CCP independently

Introduction

Bladder catheters are used for urinary drainage, or to collect urine for measurement.

Indications

- Management of urinary retention with or without bladder outlet obstruction
- Hourly urine output measurement in critically ill patients
- Daily urine output measurement for fluid management or diagnostic test
- Management of hematuria associated with clots
- Management of immobilized patients (e.g., stroke, pelvic fracture)
- Management of patients with neurogenic bladder
- Management of open wounds located in the sacral or perineal regions in patients who are incontinent
- Intravesical pharmacologic therapy
- Improved patient comfort for end-of-life care
- Management of patients with urinary incontinence following failure of conservative, behavioral, pharmacologic, and surgical therapy

Contraindications

- Urethral injury
- Pelvic trauma
- Blood at the meatus or gross hematuria associated with trauma

Caution:

- Urethral stricture
- Recent urinary tract surgery
- Artificial sphincter

Procedure

1. Position the patient supine.
2. In women, the lower extremities are frog-legged to maximize exposure of the periurethral region.
3. Sterile gloves are donned and the catheterization kit is inspected to ensure its contents are complete and free of defects.
4. **For silicone catheters**, checking the balloon should not be performed because the region of the balloon can become wrinkled making placement more difficult. The end of the catheter, if not preattached, can be connected to the drainage system before or after catheter placement.
5. Drapes are placed and the periurethral region cleansed. In men, the penis is grasped firmly with the nondominant hand and tension directed toward the ceiling, straightening the urethra. In women, the nondominant hand is used to spread the labia to facilitate cleansing the periurethral region and viewing the urethral meatus.
6. The gloved dominant hand is used to place the catheter into the urethral meatus and provide steady, gentle pressure to advance the catheter. When a coudé catheter is used, the curved tip of the catheter should be oriented toward the dorsal surface of the penis. When the catheter tip approaches the external sphincter in men, resistance will be felt. It is often helpful to pause momentarily to let the sphincter relax before continuing insertion.

7. The catheter should be inserted to the flared portion of the catheter (i.e., hub). The balloon is inflated with sterile water only after the flow of urine is seen. Saline should not be used to inflate the balloon because crystal formation may obstruct the balloon channel and prevent balloon deflation.
8. Once the balloon is inflated, the catheter is withdrawn until slight resistance is felt. The urine collection system is connected, if not already done in step 4.
9. The drainage tubing is then anchored to the leg with tape to prevent traction of the catheter on the urethral meatus.

Notes

Troubleshooting

- If no urine is obtained, gentle pressure may be applied to the suprapubic region.
- If placement of the catheter is uncertain, consider the use of agitated saline and ultrasound to confirm placement.
- If a vaginal catheterization has occurred, leave the tubing in place, gather another set, and insert. This will allow better landmarking for the second attempt.
- Gentle irrigation through the end of the catheter using 10 to 20 mL sterile saline can be performed and should return the saline mixed with urine. If the saline is not returned or any resistance to catheterization was encountered, underlying pathology may be present and urologic consultation should be obtained.
- If the patient complains of pain during insertion, the catheter should be removed.
- If blood appears at the meatus or on the tip of the catheter, a urethral injury may have occurred. Abandon the procedure and get a urological consultation.

References

1. Schaeffer AJ. Placement and management of urinary bladder catheters in adults. 2021. [Link]
2. Bajaj L, Bothner J. Urine collection techniques in infants and children with suspected urinary tract infection. 2020. [Link]

PR41: Recruitment Maneuver

Brian Reichert

Applicable To

CCP only

Introduction

A recruitment maneuver is the brief application of a high level of airway pressure, with the goal of recruiting non-gas exchanging parts of the lung. This pressure is input and then held for a period trying to open previously collapsed alveoli. This is part of an open lung strategy for hypoxic ARDS patients due to the heterogeneity of the disease process.

Indications

- ARDS criteria of moderate to severe hypoxemia as identified by the Berlin criteria. This is despite conventional low Tv ventilation and escalation of the PEEP ladder
- The presence of recruitable lung as identified by CXR, Ct, or ultrasound

Contraindications

- Hemodynamic instability
- COPD and lung emphysema
- Bronchopleural fistula
- Acute cor pulmonale

Caution:

- Severe TBI or raised ICP (All options must have failed before a recruitment maneuver in this patient demographic; a risk stratification must be completed)
- Optimal timing and frequency are unknown
- Alveolar overdistension and profound acidosis may occur with multiple maneuvers
- May not be as effective in the fibroproliferate phase

Procedure

Using the Hamilton ventilator:

1. Select Mode.
2. Choose APRV.
3. Confirm.
4. Set the T High for 40 and set the P High for 40. Other pressures may be considered based on clinical circumstances.
5. The T low and P low do not need to be set from the standard preset but to ensure they are not problematic, or if starting from APRV set them to:
   - T low for 0.60
   - P low for 10
7. The Flow Trigger can be set at 3.
8. The FIO_2 should be left at 1.
9. Confirm.
10. If no breath is started immediately, select the manual breath button as the machine may be in the expiratory phase.
11. If hemodynamic instability occurs during the maneuver, abort the breath hold by pressing the manual breath button.
12. While the ventilator is in an inspiratory hold, SCMV can be selected as the ventilation strategy post recruitment. As the pressure will start low, volume may potentially be lost. The pressure will increase +/- 2 cm/H_2O per breath and the volume will slowly increase. However, this lag time may lead to de-recruitment of lung tissue. Choose PCV instead, and allow for an

increase in PEEP to maintain the newly recruited alveoli. The rest of the settings in PCV are as per patient needs.

13. Confirm.
14. If you want to go back to SCMV after this initial stabilization on PCV you may. This will now maintain your pressure and thus your volume without losing recruitment.

Notes

- There are other recruitment maneuvers that can be performed (20-20, 30-30).
- Multiple breath holds can be done but caution is advised as respiratory acidosis associated with the breath hold may exacerbate an already acidotic patient.
- Alveolar overdistension does not appear to occur with one breath hold but multiple holds may be associated with alveolar overdistension.

References

1. Siegle MD, Hyzy RC. Ventilator management strategies for adults with acute respiratory distress syndrome. 2021. [Link]
2. Gertler R. Mechanical ventilation during anesthesia in adults. 2021. [Link]
3. Hamilton T1 Quick Manual. 2021. [Link]

PR42: EVD Monitoring and Drainage

Brian Reichert

Applicable To

CCP only

Introduction

An external ventricular drain (EVD) is a small catheter inserted through the skull, usually into the lateral ventricle, which is typically connected to a collecting device to allow for drainage of cerebrospinal fluid. The EVD can also be connected to a transducer that monitors and records ICP. This allows ICP monitoring and guidance of ICP management using the equation CPP = MAP – ICP. Cerebral perfusion can thus be guided with osmotherapy, hypertonic solutions, and vasopressors to avoid herniation and cerebral ischemia. CSF can also be drained to avoid further herniation. The overall management allows for parenchymal fluid shift, CSF drainage, and hemodynamic optimization to improve cerebral blood flow.

Indications

- Currently limited locations can insert or monitor such devices; as such it must be in situ prior to the transfer
- Hydrocephalus and neurologic decline
- TBI with a GCS ≤ 8 and an abnormal CT scan showing evidence of mass effect
- Following surgery, particularly tumor surgery, until the CSF circulation is re-established
- To enable drainage of infected CSF
- In patients with a severe head injury to provide both a means of measuring ICP and allowing CSF drainage to treat raised ICP
- ICP monitoring in severe TBI patients with a normal CT scan may be indicated if two of the following features are present: age > 40 years; motor posturing; systolic blood pressure < 90 mmHg

Contraindications

- A patient receiving anticoagulation therapy
- A scalp infection
- Caution: Caution must be used with continuous drainage since excessive drainage can lead to ventricular collapse and malfunctioning, or occlusion, of the catheter in the setting of cerebral edema in small ventricles. In the conveyance environment, the patient will not be level at all times. Therefore, continuous drainage should be avoided.

Procedure

Consult with appropriate neurological service for specific instructions and care planning during conveyance.

1. Errors in positioning the transducer:

- Too far above the foramen of Monro (FOM) will lead to a falsely low ICP measurement and insufficient drainage of CSF. In this case, intracranial hypertension would go undetected and untreated.
- Too far below the FOM will lead to a falsely high ICP measurement and excessive drainage of CSF. This may collapse the ventricles and possibly induce blockage of the system resulting in unnecessary treatments.

2. Leveling procedure:

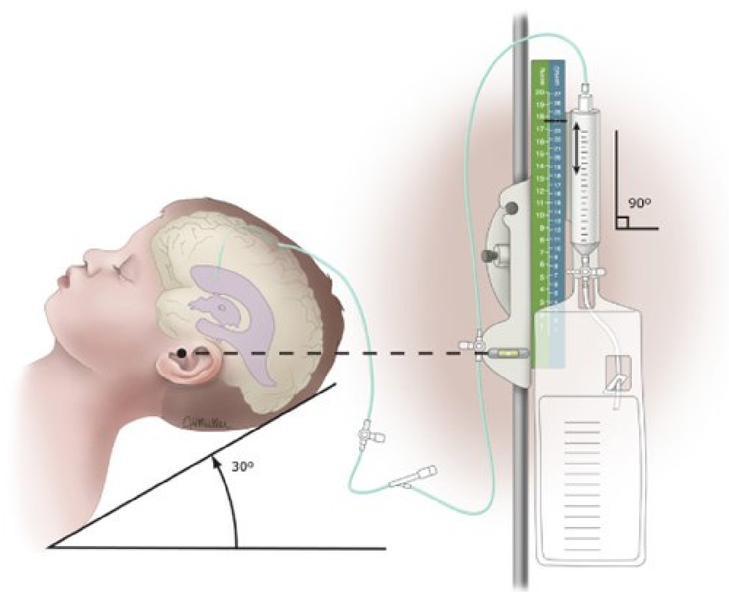
- Explain to the patient/family what is about to occur.
- Perform hand hygiene.
- Turn on the laser (protect the patient’s eyes from the laser).
- Ensure the level is horizontal and the bubble is centred between the lines.
- Turn the 3-way stopcock between the patient and the burette on the EVD system to the off position, preventing the flow of CSF.
- Alter the height of the entire EVD system to bring the transducer laser horizontal with the patient’s FOM. (Supine = tragus of the

ear; lateral = midsagittal line, between the eyebrows.)

- Once levelled, turn the 3-way stopcock between the patient and the burette on the EVD system to the on position, allowing the flow of CSF.
- This procedure needs to be followed at the beginning of the transfer and every time the patient moves or is moved.

3. Monitoring:

- Set the burette level appropriate for the individual needs. Often 15-20, but this will be patient dependent. Note the monitoring units of the burette, either cmH_2O or mmHg. The difference is 1.36. The monitor will measure in mmHg and if the burette is in cmH_2O, an ongoing calculation will have to be made to ensure accidental drainage does not occur.
- Once leveled, zero the transducer.
- Ensure connections are secure.
- Turn monitor on and ensure appropriate ICP cords are connected.
- Set appropriate alarm limits (including ICP limits).
- Perform hand hygiene.
- Zero on the monitor:
  - Turn stopcock off.
  - Lower the drip chamber until the pressure indicator window is centred over the 0 position on the pressure scale.
  - Press zero on the monitor.
  - Once the pressure transducer is zeroed, the drip chamber needs to be raised back to the desired setting.
- Turn the EVD stopcock to the off position. This will allow a pressure to be read on the monitor.
- The off position should be utilized for conveyance as bumps in the road, takeoffs, and landings will alter patient positioning and thus leveling. The off position will ensure that inadvertent drainage will not occur.
- If the ICP is increasing and drainage is required, first ensure the patient and transducer are leveled.
- If opening the stopcock for CSF drainage due to increasing ICP, turn the EVD on and ensure the drain is oscillating/draining. Keep in mind CSF is produced at a rate of 20 mL/hour.
- Key point: ICP cannot be measured if the EVD is open or on continuous drainage.
- Once opened and the goal of care is met, reset the stopcock to the closed position.



Notes

- The major complications associated with EVD use are catheter occlusion, due to clotted blood at the intraventricular orifice, and infection.
- Be aware of excessive CSF drainage if the drain is left open or inappropriately leveled.
- Patients with more severely impaired autoregulation and suboptimal CPP are best managed with efforts to lower ICP, rather than

by elevating MAP with vasopressors; hypertension is more likely to worsen cerebral edema when protective autoregulation is impaired.

- An ICP goal ≤ 22 mmHg is recommended as the threshold that predicts survival and a favourable outcome following TBI. Individual goals need to be discussed with ETP.

References

1. Cucchiara BL. Intraventricular hemorrhage. (2021). [Link]
2. Venkatakrishna R. Management of acute moderate and severe traumatic brain injury. (2019). [Link]
3. Tunstall T, Wray A. External ventricular drains and intracranial pressure monitoring. (2020). [Link]

PR43: Point of Care Testing

Brian Reichart

Applicable To

- CCP only

Introduction

The epoc® point of care analyzer is currently used for evaluation of patient blood chemistries by BCEHS critical care paramedics. This includes blood gases, hematology, electrolytes, and lactate. The assay analyzed is at the discretion of the clinician to guide patient care.

Indications

- Any patient that requires lab data to guide ongoing treatments

Contraindications

- No specific contraindications for point of care testing
- A negative Allen's test is a contraindication for a radial arterial sample

Cautions:

- Once the sample has been withdrawn and before injecting it, the sample should be rolled to ensure it has not coagulated and that your hemoglobin values will be accurate
- Ensure the reader always remains horizontal during the analyzing phase
- Ensure the cap on the vented syringe is used to avoid blood gas errors if a prolonged wait interval is experienced

Procedure

1. Prepare the patient and draw the blood sample.
2. Turn 'ON' epoc® Reader and epoc® Host.
3. Log in to Host software application.
4. Use epoc® Host to establish wireless connection with the epoc® Reader.
5. Begin test sequence.
6. Obtain a new test card and remove from pouch.
7. Insert test card into Reader.
8. The internal motor of the Reader is actuated to start the calibration process. This process releases a calibration fluid in the card that flows across sensors within the card.
9. Enter patient information, select tests, and sample type. This brings up the appropriate values in the menu.
10. If using a non-heparinized syringe, cancel the calcium value.
11. In the syringe, a meniscus is formed at the tip. The sample size is exceedingly small and, if injected, a partial air/blood sample is injected which will then develop a sample size error. Instead, eject 1 drop of blood to get rid of the meniscus and then introduce the blood to the cartridge.
12. Introduce the sample into the test card upon completion of calibration.
13. Introduce the blood sample into test card until an audible beep is heard.
14. If the syringe is withdrawn vertically, a suction will be produced at the card/syringe interface and a partial sample will accidentally be removed. To avoid this, once the sample is injected, roll the syringe off to the side.
15. The Reader sends test results to the Host. Results are calculated and displayed on the Host in approximately 30 seconds.
16. Observe, record, and analyze the results.
17. Remove the test card and discard.

18. Analyze the data and adjust patient care as needed.

Notes

- If the epoc® is outside of the temperature range, warm or cool both the epoc® and the cartridge until the temperature range is met.

References

1. Epoc® system manual. (2016). [Link]
2. Siemens Healthcare. Epoc® system manual. (2021). [Link]

PR44: Pericardiocentesis

Brian Reichert

Applicable To

RESTRICTED TO PHYSICIAN SUPPORT ONLY

Introduction

Emergency pericardiocentesis is needed only for those individuals with hemodynamic collapse secondary to a pericardial tamponade. The lethality of a pericardial effusion has been recognized since the 1600s but the evolution of pericardiocentesis correlates to the advancement of ultrasound techniques. The blind subcostal procedure remains standard when ultrasonography is unavailable, but with a high complication rate. Ultrasound can find a pericardial effusion, but the diagnosis is not radiological; it remains a clinical determination. The hemodynamic consequences of a pericardial effusion are related to the speed and volume of accumulation. Cardiac tamponade represents obstructive shock physiology when the intrapericardial pressure is greater than the intracardiac pressure.

Indications

- Acute cardiac tamponade causing overt hemodynamic compromise; this means peri-arrest or cardiac arrest that requires urgent removal of pericardial fluid.
- Obstructive shock physiology with a radiological identification of an acute pericardial effusion unresponsive to other treatment modalities.

Contraindications

- "Early" cardiac tamponade with minimal or no evidence of hemodynamic compromise may be treated conservatively, with careful hemodynamic monitoring, serial echocardiographic studies (every 2-3 days, or sooner if clinically indicated), avoidance of volume depletion, and therapy aimed at the underlying cause of the pericardial effusion
- Any delay to a centre capable of an emergency thoracotomy

Cautions:

- Severe pulmonary hypertension
- Bleeding diathesis/coagulopathy
- Aortic dissection
- Myocardial rupture

Procedure

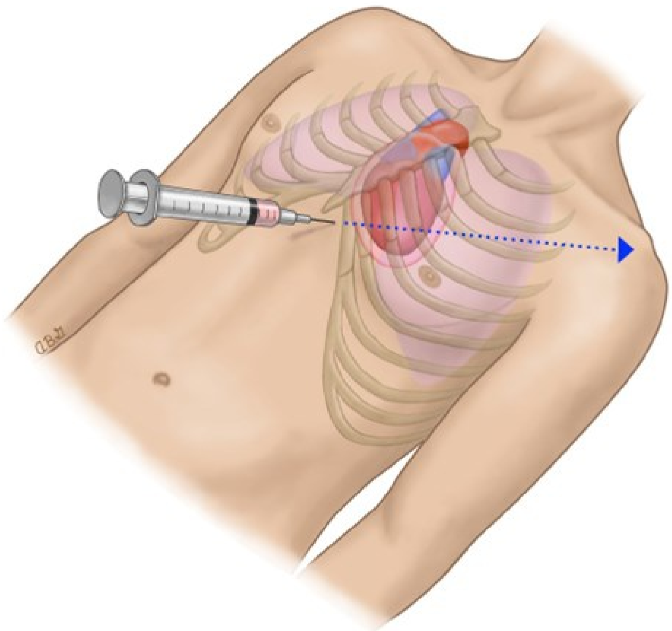
Consultation with CliniCall required prior to procedure.

1. Ensure aseptic technique.

2. Select the approach. This is determined by the largest area of pericardial fluid, as noted with ultrasound.

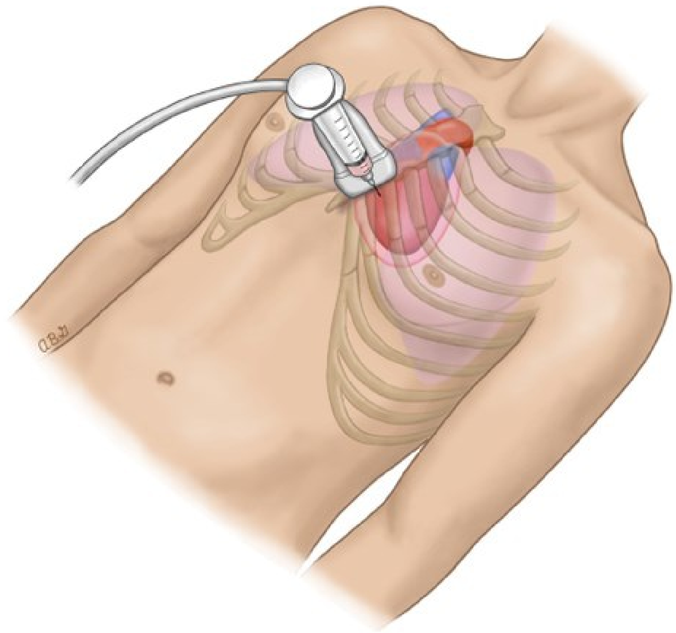
3. Anesthetize the puncture site with lidocaine if applicable and if time permits.

4. Subcostal approach:



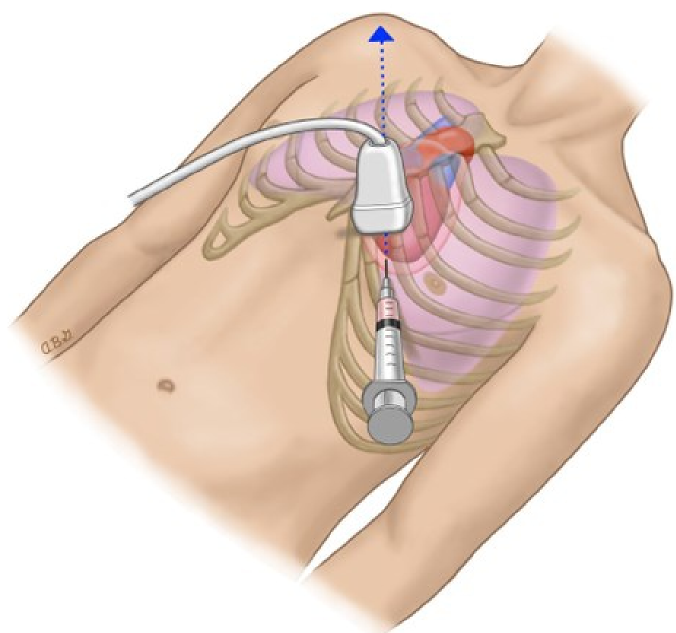
- Carefully consider the location of the mammary artery.
- Introduce the needle substernally 1 cm inferior to the left xiphocostal angle. Once beneath the cartilage cage, lower the needle so it approximates a 30° inclination with the chest wall.
- Aim the needle toward the left mid-clavicle and advance it slowly while continuously aspirating. If no fluid is aspirated, the needle should be withdrawn promptly and redirected. In the absence of ultrasound guidance, withdraw the needle to the skin and redirect it along a deeper, slightly posterior trajectory. The required depth of insertion is affected by the patient's anatomy. In most cases, a 7-9 cm needle is adequate, but longer needles (up to 12 cm) may be needed for obese patients.
- If no fluid is aspirated on the second attempt, withdraw the needle to the skin and redirect it 10° to the patient's right of the last dry needle path. Perform systematic redirected aspirations by working from the patient's left to right until the needle is aimed toward the right neck.
- Once fluid is aspirated stop advancing.
- If ventricular irritability coincides with the advancement of the needle, stop advancing and withdraw slowly.

5. Parasternal approach:



- Insert the needle perpendicular to the skin and over the cephalad border of the fifth or sixth rib immediately adjacent to the sternal margin. The cardiac notch of the left lung exposes the pericardium at this site.
- Avoid puncturing more laterally (> 1 cm) to prevent injury to the internal thoracic (mammary) vessels.
- Once fluid is aspirated, stop advancing.
- If ventricular irritability coincides with the advancement of the needle, stop advancing and withdraw slowly.
- Post procedure, assess for a pneumothorax.

6. Apical approach:



- The apical pericardiocentesis approach reduces the risk of cardiac complications by taking advantage of the proximity to the thick-walled left ventricle and the small apical coronary vessels. However, proximity to the left pleural space increases the risk for pneumothorax.

- The apical insertion site is at least 5 cm lateral to the parasternal approach within the fifth, sixth, or seventh intercostal space. Advance the needle over the cephalad border of the rib and towards the patient's right shoulder.
- Once fluid is aspirated, stop advancing.
- If ventricular irritability coincides with the advancement of the needle, stop advancing and withdraw slowly.
- Post procedure, assess for a pneumothorax.

Notes

- In contrast to the high rates of procedure related complications associated with blind aspiration, multiple observational studies of ultrasound-guided pericardiocentesis report improved safety and success.
- This is a temporizing measure and is not curative. Timely conveyance to a site able to perform a thoracostomy is paramount.

References

1. Heffner AC. Emergency pericardiocentesis. (2019). [Link]
2. Hoit BD. Cardiac tamponade. (2019). [Link]
3. Hoit BD. Diagnosis and treatment of pericardial effusion. [Link]

PR45: Prone Ventilation

Brian Reichart

Applicable To

- CCP only

Introduction

Prone ventilation is an oxygenation strategy for patients whose hypoxemia is refractory to treatment. Movement from a supine to a prone position attempts to optimize ventral-dorsal transpulmonary pressure, reduce dorsal compression, and improve lung perfusion.

Indications

- Refractory hypoxemia in the ARDS patient unresponsive to multiple attempts at optimization of ventilator settings including recruitment maneuvers
- PF ratio of < 150, prone ventilation should be considered after normal oxygenation strategies have failed
- PF ratio of < 100, prone ventilation should be attempted based on clinical presentation, time, and resource availability

Contraindications

- Spinal instability or risk of spinal instability
- Unstable pelvic or facial fractures
- Anterior burns
- Open wounds
- Shock unresponsive to vasopressors
- Pregnancy
- Recent tracheal surgery
- Raised intracranial pressure

Cautions:

- Chest tube
- Hemodynamic instability
- Cardiac abnormalities
- Thoracic and abdominal surgeries
- Difficult airway and/or massive hemoptysis

Procedure

Preparation:

1. Check for contraindications.
2. Consider possible adverse effects of prone positioning on chest tube drainage.
3. Explain the maneuver to the patient, associated health care personnel, and/or their family.
4. Confirm the endotracheal tube is located 2-4 cm above the carina.
5. Inspect and confirm that the endotracheal tube, and all central and large bore peripheral catheters, are firmly secured.
6. Consider how the patient's head, neck, and shoulder girdle will be supported after they are turned prone.
7. Stop tube feeding, check for residual, fully evacuate the stomach, and cap or clamp feeding and gastric tubes.
8. Prepare endotracheal suctioning equipment and review the process for managing copious airway secretions that may abruptly interfere with ventilation.

9. Decide whether the roll will be rightward or leftward, considering line placement, positioning within the aircraft, and ambulance stretcher orientation.
10. Support and/or pad IO site.
11. Prepare all intravenous catheters and other tubing for when the patient is prone:
    - Ensure sufficient tubing length.
    - Ensure all tubing connections are tight and secure.
    - Relocate all drainage bags to the foot of the bed.
    - Roll away from chest tubes if possible.
    - Reposition intravenous and arterial line tubing toward the patient's head.

Rolling procedure:

1. Place one (or more) people on both sides of the bed (to be responsible for the rolling processes) and another at the head of the bed (to ensure the central lines and the endotracheal tube do not become dislodged or kinked).
2. Increase the FiO_2 to 1 and note the mode of ventilation, the tidal volume, the minute ventilation, and airway pressures.
3. Pull the patient to the edge of the bed furthest from whichever lateral decubitus position will be used while rolling.
4. Move ET, OG, CVC, arterial line, and IV lines towards the head of the bed.
5. Move foley, or subdiaphragmatic lines, to the foot end.
6. Remove ECG leads and patches. Suction the airway, mouth, and nasal passages if necessary.
7. Ensure no other lines, tubes, securing devices, clips, clamps, or patches are on the patient's anterior side as these will become pressure points when the patient is lying on their anterior aspect.
8. Place the patient's arms down along their sides. Ensure that when rolling, their hands will not become pinched or contorted.
9. Place a new draw sheet over the patient.
10. Place a pillow on the ankles, waist, and chest (total 3 or more if obese).
11. Place another sturdy draw sheet over the pillows.
12. Roll the new sheets with the sheets under the patient together. One side rolls up and the other side rolls down so that the upper sheets and the lower sheets become taught.
13. Slide the patient up the bed so that the patient's head is beyond the top of the bed. In such a manner as to allow the ET tube to freely rotate when rolling the patient.
14. Turn the patient to the prone position when all parties are aware of their role.
15. Reposition the patient to the centre of the bed using the draw sheet and slide the patient down the bed to a comfortable position.
16. Ensure that the airway is not kinked and has not migrated during the rolling process. Suction the airway if necessary.
17. Support the face and shoulders appropriately, avoiding any contact of the supporting pads with the orbits or the eyes.
18. Position the arms for patient comfort. If the patient cannot communicate, avoid any type of arm extension that might result in a brachial plexus injury.
19. Auscultate the chest to check for right mainstem intubation. Reassess the endotracheal tube depth, the tidal volume, and minute ventilation.
20. Adjust all tubing and reassess connections and function.
21. Reattach ECG patches and leads to the back.
22. Slight, intermittent lateral repositioning (20 to 30°) should also be used, changing sides at least every 2 hours.
23. Document a thorough skin assessment every shift, specifically inspecting weight bearing, ventral surfaces.
24. Turn the patient's head every 2 hours to avoid pressure sores, ideally once every hour where possible.

Notes

Assessing for a response:

1. Sustained improvement in gas exchange > PaO_2 10mmHg.
2. Evidence of alveolar recruitment not increasing the risk of VILI.
3. Be prepared for significant endotracheal drainage following proning.
4. Improvement may take time.

If gas exchange, lung mechanics, or cardiovascular status deteriorates, consider moving the patient back to supine ventilation.

Complications:

1. Increased need for sedation and/or paralytics.
2. Hemodynamic instability.
3. Inadvertent endotracheal tube extubation or main stem migration.
4. Obstructed or kinked endotracheal tube.
5. Obstructed chest tube.
6. Dislodged central venous catheter.
7. Dislodged femoral hemodialysis catheter.
8. Compressed tubing infusing vasoactive medications.
9. Transient episodes of supraventricular tachycardia.

References

1. Malhotra A, Kacmarek RM. Prone ventilation for adult patients with acute respiratory distress syndrome. (2020). [Link]
2. Morgan B. Procedure for turning a ventilated patient prone. (2021). [Link]

PR46: Esophageal/Gastric Tamponade

Brian Reichert

Applicable To

CCP only

Introduction

Portal hypertension and vascular congestion result in esophageal and gastric varices which are prone to rupture. Emergency therapy to control bleeding includes endoscopic ligation and/or sclerotherapy. If these specialized therapies are not available, balloon tamponade, in addition to other therapies, is indicated to temporarily control bleeding. This guideline is specific to the Blakemore tube as it is the most common. There is a variety of tubing available and as such the volume of air and pressures changes with each tube.

Indications

- Ongoing severe variceal or upper gastrointestinal bleeding not managed by medical therapy

Contraindications

- Esophageal stricture
- Recent esophageal or gastric surgery
- Inability to intubate (The airway must be protected in all patients receiving such treatment due to impaired ability to clear oral secretions and high risk for aspiration.)

Cautions:

- The tubes should be used cautiously in patients with respiratory failure, cardiac arrhythmias, or a hiatal hernia

Procedure

The procedure below is specific to the Blakemore tube. Other tubes may have different volumes of air. The procedure is the same, but it is recommended to double check the type of tube used and the required volumes.

1. Before placing a balloon tamponade device, the patient should be intubated.
2. The patient should be supine at 45^{o}.
3. Before tube placement, all equipment should be readily at hand.
   - Blakemore
   - Salem Sump
   - A manometer (not needed for Linton tubes)
   - A tamponade tube kit (with the tube and 2 padded clamps)
   - 60 ml Luer-lock Syringe
   - 60 ml Slip-tip Syringe
   - 2 x-mas tree to male Luer-lock converters
   - 3 three-way stopcocks
   - 3 medlock caps
   - Surgilube
   - Optional: 2 Hollister ETAD ET tube securing devices
   - Possibly: Laryngoscope, Magill Forceps
4. The balloon(s) should be inflated with air and held underwater to assess for leakage and then deflated.
5. Measure the tube depth.
6. With the patient in the supine or left-lateral position, the tube is lubricated and carefully inserted through the mouth (preferred) or nostril until at least 50 cm of the tube has been introduced.

7. Once the tube is placed, insufflate the epigastrium with air while auscultating to confirm, then the ports are suctioned to remove all air.
8. The gastric balloon is then inflated with 50 mL of air and clamped with a Kelly clamp.
9. An x-ray should then be obtained to confirm placement.
   - The gastric balloon needs to be below the diaphragm. (Accidental inflation of the balloon in the esophagus or a hiatal hernia could lead to rupture.)
10. Once confirmed, the balloon is filled with an additional 200 mL of air. (A total of 250 mL of air.)
11. Once inflated, the air inlet for the gastric balloon should be clamped.
12. After the gastric balloon is inflated, the tube is pulled until resistance is felt, at which point the balloon is tamponading the gastroesophageal junction.
13. When applying traction, the tube is expected to migrate a couple centimetres due to heating and stretching. More than this may indicate a hiatal hernia and a chest x-ray needs to be performed.
14. The tube is then securely fastened or taped to a football helmet, or stable object such as the tray to maintain tension on the tube. If using the tray, do not forget to secure the patient's head as well. (Thus, continued tamponade at the gastroesophageal junction.)
15. The Salem sump is now placed in the esophagus.
16. If bleeding continues despite inflation of the gastric balloon, the esophageal balloon (if present) should be inflated to 30 to 45 mmHg. (Note this is inflated to a pressure.)
17. While the esophageal balloon is inflated, the pressure should be checked periodically.
18. Do not to overinflate the esophageal balloon as it puts the patient at risk for esophageal necrosis or rupture.
19. Once the bleeding is controlled, the pressure in the esophageal balloon should be reduced in increments of 5 mmHg to a goal pressure of 25 mmHg.
20. If bleeding resumes, increase the pressure by 5 mmHg.

Please review this video prior to placing a Blakemore tube.

Notes

- Since this is a temporizing measure, arrangements for definitive treatment (endoscopic therapy, transjugular intrahepatic portosystemic shunt [TIPS] placement, or surgery) should be made.
- Do not secure the Blakemore to the ET securing device. Use a second securing device if necessary, as accidental extubation could be catastrophic.

References

1. Bajaj JS, Sanval AJ. Methods to achieve hemostasis in patients with acute variceal hemorrhage. UpToDate. (2020). [Link]
2. Powell M, Journey JD. Sengstaken-Blakemore Tube. (2020). [Link]
3. Taddei TH. How to Insert a Blakemore Tube to Control Variceal Bleeding. (2019). [Link]

PR47: Critical Care Anesthesia Planning

Brian Reichart

Applicable To

CCP only

For ACP-level anesthesia planning for intubation, see PR18: Anesthesia Induction.

Introduction

Provision of anesthesia is one of the cornerstones of critical care practice. The ideal induction agent has a rapid onset of action, minimal side effects, and is cleared quickly so that recovery is rapid. No induction agent is ideal for all patients and all medications have side effects. This anesthesia guideline is design around the three phases for intubation: induction, maintenance, and emergence. These phases can be further divided into the four A's of anesthesia planning: anesthesia, analgesia, autonomic stability, and areflexia. The sequencing of medications and the procedure performed is based on the individual patient's needs and risk factors.

Indications

- Any patient requiring anesthesia for the purpose of intubation, maintenance, or emergence
  - Rapid sequence intubation is indicated for any patient who is at risk of aspiration with induction
- Sedation facilitated intubation
- Clinical scenarios where a difficult airway is suspected
- Delayed sequence intubation
- Patients who will not tolerate an RSI procedure due to an inability to preoxygenate, or tolerate peri-intubation procedures including hemodynamic consequences
- Awake intubation
- Predicted difficult airway
- Unstable cervical spine

Contraindications

- Allergy or sensitivity to the medication
- Lack of equipment necessary to intervene, monitor, and maintain the airway, respirations, hemodynamics, and for any potential interventions
- Lack of trained personnel to perform the procedure safely

Cautions:

Cautions should be based around a risk stratification. The complexity of risk stratification revolves around whether airway control is emergent, urgent, or elective. Elements to consider when evaluating an individual patient's risks include:

- Older age
- Significant comorbidities
- Signs of a difficult airway and whether the patient recently ate should be considered before sedation (these are not contraindications but considerations)
- Any patient that is difficult or likely difficult to ventilate
- Any patient that is hemodynamically unstable or likely to become unstable
- Obesity
- Pregnancy

Procedure

Amnesia

Induction and maintenance of amnesia is incredibly important to the long-term psychological outcomes of patients who undergo ETI. It can be achieved with the use of:

- Etomidate
- KetAMINE
- ProPOFol
- MIDAZOlam
- Dexmedetomidine

Analgesia

Effective analgesia not only makes the patient more comfortable, but also decreases the amount of post-intubation sedation required to maintain the desired clinical state through pharmacological synergy. Agents used in maintaining analgesia include:

- KetAMINE
- FentaNYL
- MORPHine
- HYDROMORphone

Autonomic Stability

Most patients will require some form of hemodynamic resuscitation in the peri-intubation phase. Hypotension is associated with an increased morbidity and mortality, which is especially true in patients with traumatic brain injuries or right heart syndromes. Use of tools such as the shock index, in conjunction with clinical judgement, can identify patients at risk of hypotension in the context of endotracheal intubation. Autonomic stability can be achieved through the use of:

- Fluid bolus
- PhenyLEPHRine
- EPINEPHrine
- NORepinephrine

Areflexia

Areflexia produces the best laryngoscopic views possible, however it is also fraught with complications and potentially dire consequences. It also lowers the required dose of sedation. Deep sedation does *not* result in areflexia, but rather suppresses any response to stimulus. Consider the use of:

- Succinylcholine (Depolarizing)
- Rocuronium (Non-Depolarizing)

Adult doses are shown in the table below. See individual drug monographs for pediatric and expanded dosing strategies.

Goal	**Options**	**Induction (Phase I)**	**Maintenance (Phase II)**	**Emergence (Phase III)**
Analgesia	MORPHine FentaNYL KetAMINE Hydromorphone	Morphine (2-10mg) Fentanyl (25-100mcg) Ketamine (0.25-0.5 mg/kg) Hydromorphone (0.2-1mg)	Morphine (1-10mg/hr) Fentanyl (25-200mcg/hr) Ketamine (0.05-1 mg/kg/hr) Hydromorphone (0.5-3mg/hr)	See procedural analgesia if required

Amnesia	MIDAZOlam KetAMINE Propofol Etomidate Dexmedetomidine	Midazolam (0.1-0.3 mg/kg) Ketamine (0.5-2 mg/kg) Propofol (1-3 mg/kg) Etomidate (0.3 mg/kg)	Midazolam (0.01-0.1mg/kg/hr) Ketamine (0.2-0.5 mg/kg/hr) Propofol (50-200mcg/kg/min) Dexmedetomidine (0.1-0.8 mcg/kg/hour)	See procedural sedation if required
Autonomic Stability	IV Fluids PhenyLEPHRine EPINEPHrine NORepinephrine DOPamine	IV Fluids (10-20ml/kg) Phenylephrine (50-100 mcg) Epinephrine (50-100 mcg) NORepinephrine (5-10 mcg)	IV Fluids (2-4ml/kg/hr) Phenylephrine (0.5-6mcg/kg/min) Epinephrine (0.01-0.5 mcg/kg/min) NORepinephrine (5-60 mcg/min) Dopamine (2-20mcg/min)	IV Fluids (2-4ml/kg/hr)
Areflexia	Rocuronium Succinylcholine Cisatracurium	Rocuronium (0.6-1.2 mg/kg) Succinylcholine (0.6-1.1 mg/kg) Cisatracurium (0.15-0.2 mg/kg)	Rocuronium (0.6-1 mg/kg) Cisatracurium (1-2 mcg/kg/min)	-------------

References

1. King A. Induction of general anesthesia: Overview. (2020). [Link]
2. **King A. General anesthesia: Intravenous induction agents. (2020). [Link]**
3. Berkow L. Rapid sequence induction and intubation (RSII) for anesthesia. (2020). [Link]
4. Brown CA. Approach to the anatomically difficult airway in adults outside the operating room. (2021). [Link]
5. Sterns RH. Maintenance and replacement fluid therapy in adults. (2019). [Link]

PR48: Arterial Blood Gas Sampling

Arterial Blood Gas Sampling

Applicable To

CCP only

Introduction

Arterial blood gas analysis provides insight into many aspects of critical care. Samples can be obtained from either an arterial puncture or from an existing arterial line.

Indications

- The need for acquisition of an arterial blood sample to assess:
  - Arterial oxygenation
  - Arterial acid-base status
  - Electrolyte levels

Contraindications

- Infection, thrombus, or distorted anatomy at the site of puncture.
- Abnormal modified-Allen's test suggesting inadequate distal collateral flow.
- Severe peripheral vascular disease or Raynaud's syndrome affecting the puncture site.

Cautions

- Arterial punctures for blood gas analysis should preferentially be taken from the radial artery.
- Monitoring for bleeding or adverse effects (i.e., impaired distal blood blow) should be undertaken following any arterial sampling.
- Arterial sampling should be minimized where possible to reduce the risks of infectious exposure and bleeding.
- Vasospasm, nerve damage, and vasovagal syncope can all result from arterial puncture and should be anticipated.

Procedure

Arterial Puncture Sampling

1. Gather necessary equipment:
   1. Heparinized, vented 23g sampling syringe/needle
   2. Bandage or gauze
   3. Alcohol wipes and/or appropriate site cleanser
   4. Local anesthetic (lidocaine 1% or 2% without epinephrine) plus single-use syringe if required.
2. Select the site for puncture considering:
   1. Ease of access
   2. Strength of pulse
   3. Ability to compress the site
   4. Collateral blood flow (modified-Allen's test may be used)
3. Utilize aseptic technique including hand hygiene, gloves, and cleaning of the selected site.
4. Palpate artery and insert needle at approximately a 45-degree angle to obtain flash.
5. Ultrasound may be used to aid in the acquisition.
6. Obtain flash and allow syringe to fill without manipulating the plunger.
7. Withdraw needle when a sufficient sample is obtained and secure the needle.
8. Expel excess air using the plunger and the cap in place.
9. Apply gauze and pressure to the site for a length of time sufficient to stop any bleeding.

10. Dress the site with a bandage if not already done.
11. Perform hand hygiene.
12. Utilize the blood sample for analysis. (Point of Care Testing)
13. Monitor the site of puncture for ongoing bleeding or complications.

Arterial Line Sampling (VAMP™ line)

1. Gather necessary equipment:
    1. Heparinized, vented 23g sampling syringe/needle
    2. VAMP™ blunt access tip
    3. Alcohol wipes and/or appropriate site cleanser
2. Remove arterial sampling needle and attach VAMP™ blunt access tip to the sampling syringe
3. Turn stopcock at sample access port to allow for line flow and sampling
4. Squeeze the VAMP reservoir module tabs and pull back over 3-5 seconds to fill the reservoir with blood.
5. Close valve next to reservoir to prevent clearance blood from being sampled.
6. Clean the access port.
7. Insert the syringe with blunt access tip into sampling port and obtain sample.
8. Open the valve next to the reservoir.
9. Push the reservoir down slowly to replace the withdrawn blood.
10. Open the proximal valve and flush the arterial line.
11. Ensure adequate waveform on arterial tracing.

Arterial Line Sampling (non-VAMP™ line)

1. Gather necessary equipment:
    1. Heparinized, vented 23g sampling syringe/needle
    2. VAMP™ blunt access tip
    3. 10cc syringe with blunt tip
    4. Alcohol wipes and/or appropriate site cleanser
2. Remove arterial sampling needle and attach VAMP™ blunt access tip to the sampling syringe.
3. Attach 10cc syringe to open port of the stopcock distal to the transducer.
4. Turn the stopcock such that it is closed proximally and open to the patient and 10cc syringe.
5. Withdraw a minimum of 5cc's of blood into the 10cc syringe.
6. Close the stopcock to the syringe.
7. Remove and discard the 10cc syringe and blood.
8. Turn the stopcock such that it is closed distally (to patient) and open to the distal/fluid side and the open port.
9. Briefly flush the port into a disposable container to clear any blood from the port by pulling on the flush valve tab, mindful of the potential for splash, and then cap the open port with a sterile non-vented cap.
10. Insert the syringe with blunt access tip into sampling port distal to the stopcock and obtain sample.
11. Turn the stopcock such that it is closed to the free port and open to the patient and fluid side and flush the arterial line until it is free from blood.
12. Ensure adequate waveform on arterial tracing.

Notes

- Consider the use of venous samples when appropriate.
- Arterial samples are often not required if oxygenation is known to be appropriate and SpO_2 levels are adequate and reliable.
- Venous blood gas samples can be adapted to determine acid-base status with the appropriate conversions. (Excluding a reliable PaO_2)

References

- Theodore, AC. (2021). Venous blood gases and other alternative to arterial blood gases. In S. Manaker & G. Finlay (Eds.), *UpToDate.* Retrieved February 2, 2021, from https://www.uptodate.com/contents/venous-blood-gases-and-other-alternatives-to-arterial-blood-gases
- Theodore, AC. (2021). Arterial blood gases. In S. Manaker & G. Finlay (Eds.), *UpToDate.* Retrieved February 2, 2021, from https://www.uptodate.com/contents/arterial-blood-gases
- WHO Guidelines on Drawing Blood: Best Practices in Phlebotomy. Geneva: World Health Organization; 2010. Available from: https://www.ncbi.nlm.nih.gov/books/NBK138661/

PR50: Traction (Sager) Splinting

Applicable To

- EMR and above

Introduction

The Sager traction splint is a unipolar split that can be used to align femur fractures. Proper splinting increases arterial blood flow, decreases pain and spasm, and lowers the risk of further injury from bone fragments.

Indications

- EMR: Open or closed mid-shaft fractures of the femur in patients who are otherwise clinically stable

Contraindications

- Clinical instability
  - Caution: The energy required to fracture a femur is significant, and may produce other occult or distracting injuries. If there is any doubt as to the clinical stability of the patient, do not attempt to place the traction splint -- splint the injured leg against the uninjured leg and expedite conveyance to hospital.
- Hip or pelvic fracture
- Supracondylar fracture of the distal femur, or knee involvement
- Fractures of the ankle or the foot
- Partial amputation or avulsion with bone separation and only marginal distal tissue connection

Procedure

Appropriate analgesia should be provided throughout the splinting procedure. See E08: Pain Management for additional information.

1. Manage any visible external bleeding and provide appropriate wound care where required.
2. Assess the injured leg for distal neurovascular function. If appropriate resources are available, provide manual inline traction prior to splinting.
3. Place the splint along the medial aspect of the injured leg. Adjust its length so that it extends approximately four inches (10 cm) beyond the heel.
4. Secure the top strap to the thigh.
5. Apply the ankle hitch, and attach it to the splint.
6. Apply traction by extending the splint:
   - For closed femur fractures: Adjust the splint to 10% of the patient's body weight in Imperial units, to a maximum of 15 pounds (7 kg).
   - For open femur fractures: Apply 5 pounds (2.5 kg) of traction regardless of the patient's body weight.
7. Reassess the distal neurovascular function.
8. Apply the straps to secure the leg to the splint. Reassess distal neurovascular function following the application of the straps. Ongoing reassessment during conveyance is required.
9. Secure the patient on a clamshell lifting device for transport. Be aware of the positioning of the distal portion of the splint during lifting and loading operations. Ensure the patient is positioned on the stretcher with sufficient space to allow the rear doors of the ambulance to close completely.

Notes

There is no specific age limit on the use of the Sager splint, however the splint must be able to fit the patient safely. Use the smallest extension possible to achieve appropriate traction.

When adjusting the extension, be aware of the pinch point that exists with the locking mechanism.

Resources

- Sager user handbook (BCEHS uses the S301 model)

References

1. Syme K. Are you pulling my leg? Does the use of traction splints in the prehospital management of patients with femur fractures reduce the complications compared to traditional splinting? 2020. [Link]
2. Davis D et al. EMS traction splint. 2021. [Link]
3. Sunmedica, Inc. Sager user handbook. (n.d.) [Link]

PR51: Prehospital Fibrinolysis

Jon Deakin

Applicable To

- ACP with specific reperfusion training

Introduction

This procedure has been developed to support out-of-hospital reperfusion in patients experiencing ST elevation myocardial infarctions (STEMI) in areas without immediate access to cardiac catheterization laboratories. It requires specific training in out-of-hospital reperfusion. This procedure is not a substitute for sound clinical judgment and collaborative decision-making.

Indications

Suspected ST elevation myocardial infarction in an area without immediate access to primary percutaneous coronary intervention facilities.

Contraindications

Extensive contraindications: see procedure for complete details.

Procedure

All patients:

- Apply defibrillator pads
- Provide supplemental oxygen if SpO2 is less than 90%
- Acquire and interpret 12 lead ECG -- transmit to CliniCall/EPOS immediately if STEMI markers present
  - Continue to obtain serial 12 lead ECGs every 15-30 minutes during care and conveyance
- Establish IV access (two large-bore lines recommended), including saline lock
  - Avoid right hand/wrist where possible; attempt to keep IVs on same limb where practicable
- Obtain baseline history and examination (details below)
- Acetylsalicylic acid 160 mg PO chew and swallow
- Nitroglycerin 0.4 mg spray every 5 minutes x 3 doses for ongoing chest pain if systolic blood pressure is greater than 90 mmHg
- FentaNYL 25-50 mcg IV every 5 minutes as required (maximum 300 mcg) **or** MORPHine 2.5 mg IV every 5 minutes as required (maximum 15 mg) if systolic blood pressure is greater than 90 mmHg for severe, refractory chest pain
- DimenhyDRINATE 25-50 mg IV every 4 hours as required for nausea
- Atropine 0.6 mg IV/IM every 5 minutes as required (maximum 3 mg) for symptomatic bradycardia
- **Contact CliniCall / EPOS after appropriate history, physical, inclusion / exclusion criteria reviewed with patient and ECG sent**

History (check all that apply, and review with EPOS):

- Chest pain
  - Crushing, burning or dull retrosternal
  - Radiating to _________
  - Worse with activity or exertion
  - Worse while supine, improves while sitting forward
  - Sharp (knife- or needle-like) and worse with respiration
  - Sharp stabbing or tearing
- Focal neurological symptoms (limb weakness, visual change, speech difficulties)
- Loss of consciousness associated with presentation

- Associated symptoms (nausea, diaphoresis, SOB)
- Comorbidities (HTN, diabetes, smoking, familial hx)

Physical examination (check all that apply, and review with EPOS):

- Pupils are equal in size, round, and reactive to light
- GCS __/15, HR ___, RR ___, Sp02 ___%
- Blood pressure
  - Right arm
  - Left arm
  - Systolic difference is > 20 mmHg?
- Pulses present and equal in left and right arms
- Pulses present and equal in both carotid arteries (caution: check one at a time)
- Air entry is equal to both lung bases
- Crepitations heard in lung fields?
- Murmur heard on cardiac auscultation
- Moves all four limbs against resistance.

Indications for primary percutaneous coronary intervention (check all that apply, and review with EPOS):

- Contraindication to tenecteplase, **OR**
- Cardiogenic shock, **OR**
- Severe acute heart failure, **OR**
- Recurrent VF/VT, **OR**
- First medical contact to balloon time < 120 minutes (<60 minute drive time) **OR**
- Diagnosis of STEMI in doubt

Indications for tenecteplase (TNK) administration (check all that apply, and review with EPOS):

- Time from onset of chest pain is less than 12 hours
- Chest pain is consistent with myocardial ischemia
- ECG changes are consistent with STEMI:
  - In men, new STE at J point ≥ 2.0 mm (0.2 mV) in V2 and V3
  - In women, new STE at J point ≥ 1.5 mm (0.15 mV) in V2 and V3
  - New STE at J point ≥ 1.0 mm (0.1 mV) in other contiguous leads
  - New ST depression at the J point ≥ 1.0 mm (0.1 mV) in leads V1/V2 and STE ≥ 1 mm (0.1 mV) in posterior leads V7-V9

ABSOLUTE CONTRAINDICATIONS FOR TENECTEPLASE (CHECK ALL THAT APPLY, AND REVIEW WITH EPOS):

- Any prior bleeding in the brain
- Structural abnormality of arteries or veins in brain
- Known tumour in brain
- Ischemic stroke within the last 3 months
- Significant closed head or facial trauma in the last 3 months
- Brain or spinal injury within the last 2 months
- Active bleeding or bleeding susceptibility (excluding menses)
- Severe uncontrolled hypertension (unresponsive to emergency therapy)
- Suspected aortic dissection

Relative contraindications for tenecteplase (check all that apply, and review with EPOS):

- Known intracranial pathology not covered by absolute contraindications
- Dementia
- Prior stroke greater than 3 months ago
- Major surgery in the past 3 weeks
- Internal bleeding in the past 4 weeks
- Blood pressure greater than 180 systolic, or 110 diastolic on presentation

- History of chronic, severe, poorly controlled hypertension
- Traumatic or prolonged (> 10 minutes) chest compression/CPR
- Pregnancy
- Active stomach ulcers
- Currently taking blood thinners (i.e., warfarin or direct oral anticoagulants)
- Non-compressible vascular punctures

Tenecteplase criteria -- must satisfy all -- check when complete:

- NO indications for primary PCI
- Case discussed and ECG reviewed with EPOS
- NO absolute contraindications
- Relative contraindications, if any, reviewed with EPOS
- Risks, benefits, and alternatives to tenecteplase have been reviewed with patient, and CONSENT (verbal) to treatment with TNK is obtained

Tenecteplase action (choose one):

- DOES NOT MEET TNK criteria
  - Action: provide usual care and transport
- DOES MEET TNK criteria
  - Action: administer TNK as per protocol

Tenecteplase informed consent script (read to patient):

> *"You are having a heart attack and would benefit from potentially life-saving clot dissolving medications. When given early, these drugs can prevent the heart attack from progressing and causing further heart muscle damage. They can even prevent death from a heart attack and related complications. There are some serious risks associated with the use of these medications, though, that you need to be aware of. Those risks include, but are not limited to, bleeding, strokes, and heart rhythm problems. The risk of bleeding in the brain is less than 1%. We are able to deliver these therapies to you immediately, and the sooner you get these medications the sooner blood supply may be restored to your heart. You have the option of declining these medications and waiting to be assessed when you go to the hospital, although it is important to know that if treatment is given more than 12 hours after onset of symptoms, treatment may cause more harm than benefit. Do you give consent to receive this treatment?"*

Tenecteplase Protocol (check when complete)

75 years of age or less	over 75 years of age
• Enoxaparin 30 mg IV bolus immediately before tenecteplase	• **DO NOT GIVE IV** ENOXAPARIN
• Tenecteplase according to weight IV, over 5 seconds (maximum dose is 50 mg)	• Tenecteplase (1/2 dose) according to weight IV, over 5 seconds (maximum dose is 25 mg)
• Enoxaparin 1 mg/kg SC every 12 hours (maximum dose 100 mg q12h)	• Enoxaparin 0.75 mg/kg SC every 12 hours (maximum dose 75 mg q12h x first 2 doses)
• Clopidogrel 300 mg PO	• Clopidogrel 75 mg PO

NB: In certain situations, the consulting physician may recommend the administration of enoxaparin and clopidogrel without tenecteplase.

Tenecteplase Dosing based on **Age and Weight**		
Weight (kg)	TNK (mg) in age 75 or less	TNK (mg) in age over 75
<60	30 mg (6 mL)	15 mg (3 mL)
60 to <70	35 mg (7 mL)	17.5 mg (3.5 mL)
70 to <80	40 mg (8 mL)	20 mg (4 mL)
80 to <90	45 mg (9 mL)	22.5 mg (4.5 mL)
≥90	50 mg (10 mL)	25 mg (4 mL)

Enoxaparin SC Dosing - based on **Age and Weight**			
Age equal of less than 75		**Age greater than 75**	
Weight (kg)	**Dose** 1 mg / kg (volume)	**Weight (kg)**	**Dose** 0.75 mg / kg (volume)
40 to 44	40 mg (0.4 mL)	40 to 46	30 mg (0.3 mL)
45 to 54	50 mg (0.5 mL)	47 to 59	40 mg (0.4 mL)
55 to 64	60 mg (0.6 mL)	60 to 73	50 mg (0.5 mL)
65 to 74	70 mg (0.7 mL)	74 to 86	60 mg (0.6 mL)
75 to 84	80 mg (0.8 mL)	87 or greater	70 mg (0.7 mL)
85 to 94	90 mg (0.9 mL)		
95 or greater	100 mg (1 mL)		

Post tenecteplase administration:

- Notify receiving ER physician of patient arrival, and report:
  - Patient started on TNK as per physician orders
  - TNK administered at _____, with patient weight and dosage
  - Any protocol medications not administered and rationale
  - Current patient status (GCS, appearance, vital signs, chest pain, etc.)
  - Estimated time of arrival in emergency department
  - Where possible: PHN, name, date of birth for pre-arrival registration
- After TNK administration, monitor neurological vitals every 15 minutes for the first hour, and then every 30 minutes thereafter
- After TNK administration, repeat ECG every 15-30 minutes and at 60 minutes. Notify EPOS if:
  - Ongoing chest pain
  - Ongoing ST elevation (less than 50% resolution)
  - Hemodynamic instability develops
- On admission to emergency department:
  - Complete all relevant sections of ePCR, including ACP prehospital fibrinolysis form (Other Assessments), Hospital Consultation (Procedures), patient weight, vital signs
  - Attach 12 lead ECG to ePCR
  - Leave ePCR and copy of 12 lead ECG with the patient's chart
  - Send e-mail including the event number to **clinicalpractice@bcehs.ca**

Resources

Drug monographs:

- Acetylsalicylic acid
- Nitroglycerin
- FentaNYL

- MORPHine
- DimenhyDRINATE
- Atropine
- Enoxaparin
- Tenecteplase
- Clopidogrel

References

- 2023-09-10: updated consent script

PR52: Dialysis Emergency Disconnect Procedure

PR52: Dialysis Emergency Disconnect Procedure

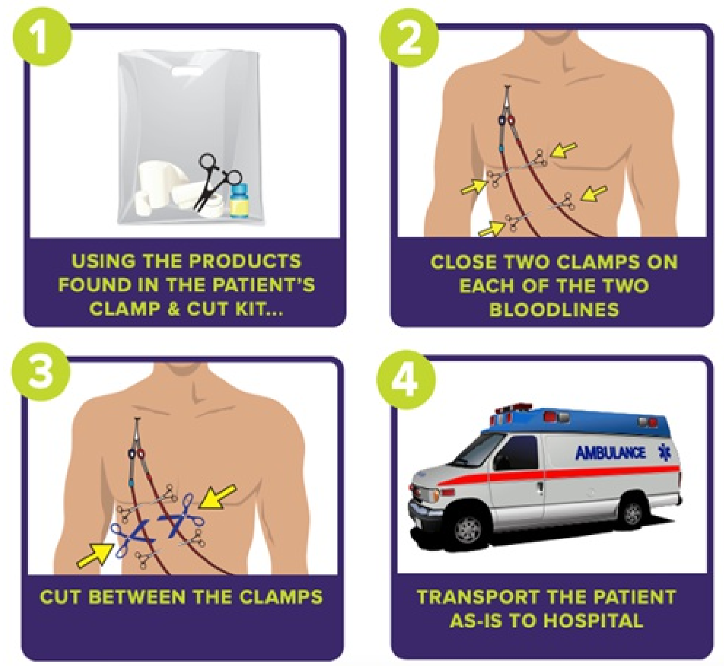
Classification

All License Levels:

ClinCall consultation recommended to discuss care planning options for all patients, where possible.

Emergency Disconnect Instructions

For dialysis patients with a central catheter:



For patients with a fistula or graft: