Justice Institute
BRITISH COLUMBIA

LEARNING THAT TAKES YOU BEYOND

Primary Care Paramedic

Training Treatment and Protocols Manual

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Introduction

Welcome to the 2023 Training Treatment & Protocols Manual (TT&P). This document has been specifically designed to highlight the clinical developments we have made over the past 12 months, all of which have been incorporated into this current version of the TT&P. Analysis of the updates is detailed below.

The TT&P is specifically designed to help clinicians identify and manage the common conditions and injuries managed in a pre-hospital setting, giving practical guidance on treatments options and drug therapy.

It's widely known that Paramedics now operate at much more than a 'treat & transport service' and our role is rapidly evolving – we now participate in advanced skills and employ specialist therapeutics that previously would have been performed in an emergency room setting.

JIBC has adopted the BCEHS Clinical Practice Guidelines, Drug Monographs, and Clinical Resources published through the *BCEHS Handbook* and app. See details to download the app for smart phones from our Practice Education Resource Centre: https://pe.jibc.ca/paramedicine/clinical-practice-guidelines/

At JIBC, we strive to be the leader in public safety education, as such with ongoing research and investigation into clinical advancements we continue to be at the forefront of clinical education for Paramedics in British Columbia.

We welcome all feedback about current TT&P version. Please do provide this via your Lead Instructor or RTC as this helps us shape the future of paramedicine.

GUIDELINES	
General Guidelines:	**Update & Rationale:**
Critical Intervention List	Added clearer direction toward specific Principle of Management for various interventions.
Guidelines: Paramedic Communication	Update: Added new section regarding paramedic communication.

PRINCIPLES OF MANAGEMENT	
Principles of Management:	**Update & Rationale:**
Eye Injuries	Instruction to cover both eyes in the event of any eye injury to prevent sympathetic eye movement.

TRAINING PROTOCOLS	
Training Protocol:	**Update & Rationale:**
Cardiac Chest Pain Protocol:	Emphasis placed on early ASA administration without need for vital signs to promote administration of antiplatelets sooner. Increased systolic blood pressure threshold to 110 mmHg for both prescribed & non prescribed patients.
Shortness of Breath Protocol:	For CPAP administration, a call to Medical Direction is recommended, previously mandatory.
Tranexamic Acid Protocol:	Reduce age threshold from 16 years to 12 years of age in-line with BCEHS Clinical Practice Guidelines.

DRUG MONOGRAPHS	
Nitroglycerin	**Systolic blood pressure threshold increased to 110 mmHg.**
Tranexamic Acid Protocol:	Age threshold reduced from 16 years to 12 years of age
Reference: *BCEHS Handbook* for drug monographs.	

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Guidelines

Patient Assessment — Guidelines

The Paramedic Academy Patient Assessment consists of seven components, each of which has a number of steps. The following table lists the steps and the purpose of each component:

COMPONENT	STEPS	PURPOSE
Scene Assessment	• Hazards • Environment • Mechanism of injury/nature of illness • PPE / Number of Patients • Back-up needed?	The purpose of the scene assessment is to ensure that the scene is safe for the crew and patient, and to provide information about the nature and extent of the patient's injuries or condition.
Initial Assessment	• Visual assessment • C-Spine consideration • (AVPU) • Airway (manual, adjunct, position) • Breathing (skin, O2, ventilation, position) • Circulation (skin, position) • Rapid Assessment	The purpose of the initial assessment is to identify and manage life or limb- threatening injuries and conditions.
Treatment and Transport Considerations	• Transport Decision	The purpose of the focused history and physical examination is to identify the patient's chief complaint, establish a baseline set of vital signs, and gather information about the patient's injuries and condition.
	• Focused Assessment	
	• Top 3 Differentials	
	• Baseline Vital Signs (Focused History, Allergies, Medications, Past medical History, Symptoms Assessment)	
	• Infer Provisional Diagnosis	
	• Reassess Transport Decision	
Treatments	• Wound care • Fracture management • Spinal management • Burn management • Management of specific injuries and conditions	Treatments are non-medical procedures that do not require direct physician supervision. Treatments are provided once a paramedic has ruled out differentials, and determined a provisional diagnosis.
Protocols	• Various	Protocols allow the PCP to perform medical procedures that are normally in the domain of a physician.
Load and Transport	• Cot • Reassessment • Equipment • Transport mode • Notification (ISBAR)	
Records and Reports	• Forms • Reports (ATMIST AMBO)	Reports are used to gather or give information regarding the patient's status and treatment. These include hospital notification, triage and bedside reports. Forms are used to record assessment and treatment of a patient.

Intervention List

It may be necessary to intervene at any point within the Patient Assessment.

Indication – Finding suggests need of further investigation, intervention and/or treatment/packaging. May be found at any time through Patient assessment.

Primary Intervention -- listed following best practice following a staged approach and cover skills within the PCP Full Scope of Practice.

Further Treatment/Packaging of Intervention -- suggested POM and Protocols which may give more details on specific treatment/packaging of injury.

The following is the Intervention list:

C-Spine, A,B,C Indication (Scene or Initial assessment)	C-Spine, A,B,C Primary Intervention	Further Treatment/Packaging of Intervention
C-Spine Considerations • Potential Spinal Column/Cord injury	• Manual stabilization	See for more details: • POM – Head, Face & Neck – Mgmt. of Potential Spinal column/cord injuries
Airway • Airway Foreign Body (AFB) Responsive Patient	• Back Blows/Abdominal Thrusts	See for more details: • Airway Foreign Body Protocol
Airway • Airway Foreign Body (AFB) Unresponsive Patient	• Attempted Ventilations via BVM • Chest Compressions	See for more details: • Airway Foreign Body Protocol
Airway • Obstructed (fluid, vomit, secretions)	• Positioning (3/4 or sitting up) • Suction	Maintain: • Airway Position • Airway Adjunct • Assisted Ventilations (if indicated)
Breathing • Absent, Agonal or Irregular	• Assisted Ventilations via BVM (if required)	See for more details: • POM – Toxicological – Mgmt. of Narcotic Drug Overdose – Mgmt. of Drug Abuse / Overdose – Mgmt. of Severe Alcohol Intoxication • Suspected Narcotic Overdose Protocol • Airway Foreign Body Protocol
Breathing • Laboured / Distressed	• Positioning • Oxygen via concentration mask • Assisted Ventilations via BVM	• Consider CPAP • Consider PEEP (awareness only) See for more details: • POM – Mgmt. of Shortness of Breath • POM – Mgmt. of Anaphylaxis • Shortness of Breath Protocol & Guidelines • Anaphylaxis Protocol & Guidelines • Airway Foreign Body Protocol
Circulation • Absent Carotid Pulse	• Chest Compressions	See for more details: • POM – Mgmt. of Cardiac Arrest • Cardiac Arrest Protocol – Medical • Cardiac Arrest Protocol – Trauma • Cardiac Arrest Protocol – Newborn • Cardiac Arrest Protocol – Pediatric • Cardiac Arrest Protocol Guidelines • Airway Foreign Body Protocol
Circulation • Critical Hemorrhage	Apply manual direct pressure • Major bleed = use gloved hand apply manual direct pressure • Moderate bleed = use a bulky dressing apply manual direct pressure	See for more details: • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines • BCEHS Handbook - Clinical Practice Guidelines - H01: Principles of Major Trauma

Traumatic injuries Indication	Rapid Assessment	Further Treatment/Packaging of Intervention
Abdomen • Blunt	• Position Supine if hypotensive, OR • Position of comfort (if not hypotensive) • Oxygen via concentration mask in anticipation of shock	See for more details: • POM – Blunt – Mgmt. of Blunt Abdomen • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines • Nausea/Vomiting Protocol & Guidelines
Abdomen • Evisceration	• Corral contents with moist sterile dressings	See for more details: • POM - Penetrating - Mgmt. of Penetrating Abdomen • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines
Abdomen • Impaled Object	• Control Moderate to Major hemorrhages as per the BCEHS Handbook - Clinical Practice Guidelines - H01: Principles of Major Trauma • C-spine consideration • Manually support impaled object in place • Look for entrance and exit wounds	See for more details: • POM - Penetrating - Mgmt. of Penetrating Abdomen • POM – Head, Face & Neck – Mgmt. of Potential Spinal column/cord injuries • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines
Abdomen • Penetrating Abdomen	• Gloved hand on wound • Control Moderate to Major hemorrhages as per the BCEHS Handbook - Clinical Practice Guidelines - H01: Principles of Major Trauma • C-spine consideration • Look for entrance and exit wounds	See for more details: • POM - Penetrating - Mgmt. of Penetrating Abdomen • POM – Head, Face & Neck – Mgmt. of Potential Spinal column/cord injuries • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines
Burns • Airway	• Oxygen via Concentration mask • Position for ease of breathing • Assisted Ventilations via BVM • Transport as priority	See for more details • POM – Burn – Mgmt. of All Burn injuries • Pain Management Protocol & Guidelines
Burns • Chemical	• Flush/ Cool 20 minutes (or refer to SDS)	See for more details • POM – Burn – Mgmt. of All Burn injuries • Pain Management Protocol & Guidelines
Burns • Electrical	• Cool 20 minutes • Look for entrance and exit wounds	See for more details • POM – Burn – Mgmt. of All Burn injuries • Pain Management Protocol & Guidelines
Burns • Thermal	• Cool 20 minutes	See for more details • POM – Burn – Mgmt. of All Burn injuries • Pain Management Protocol & Guidelines

Traumatic injuries Indication	Rapid Assessment	Further Treatment/Packaging of Intervention
Chest • Flail Segment & Fracture Rib	• Patient to self-splint	See for more details: • POM – Blunt – Mgmt. of Blunt Chest • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines
Chest • Impaled Object	• Control Moderate to Major hemorrhages as per the BCEHS Handbook - Clinical Practice Guidelines - H01: Principles of Major Trauma • C-spine consideration • Manually support impaled object in place • Look for entrance and exit wounds	See for more details: • POM – Penetrating – Mgmt. of Penetrating Chest • POM – Head, Face & Neck – Mgmt. of Potential Spinal column/cord injuries • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines
Chest • Penetrating Chest	• Gloved hand on wound • Control Moderate to Major hemorrhages as per the BCEHS Handbook - Clinical Practice Guidelines - H01: Principles of Major Trauma • C-spine consideration • Look for entrance and exit wounds	See for more details: • POM – Penetrating – Mgmt. of Penetrating Chest • POM – Head, Face & Neck – Mgmt. of Potential Spinal column/cord injuries • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines
Environmental • Cold Emergencies	• Remove patient from environment as soon as functional	See for more details: • POM – Environmental – Mgmt. of Cold emergencies Specific treatments for: – Mild Hypothermia – Moderate Hypothermia – Severe Hypothermia – Superficial Frost bite – Deep Frost bite • Altered Mental Status Guidelines • Cardiac Arrest Protocol – Medical & Guidelines • Cardiac Arrest Protocol – Trauma & Guidelines • Pain Management Protocol & Guidelines

Traumatic injuries Indication	Rapid Assessment	Further Treatment/Packaging of Intervention
Environmental • Heat Emergencies	• Remove patient from environment as soon as functional	See for more details: • POM – Environmental - Mgmt. of Heat Emergencies Specific treatments for: – Heat Cramps – Heat Exhaustion – Heat Stroke • Fluid Resuscitation Protocol & Guidelines • Altered Mental Status Guidelines
Eye • Extruded Eyeball	• Control Moderate to Major hemorrhage • C-spine consideration • Support extruded eye & surrounding tissue with sterile dressings.	See for more details: • POM – Head, Face & Neck – Mgmt. of ALL Head, Face & Neck • Tranexamic Acid (TXA) Protocol & Guidelines
Eye • Impaled Eye injury	• Control Moderate to Major hemorrhage • Manually support impaled object in place	See for more details: • POM – Head, Face & Neck – Mgmt. of ALL Head, Face & Neck • Tranexamic Acid (TXA) Protocol & Guidelines
Eye • Penetrating eye injury	• Control external hemorrhage by applying manual direct pressure with a bulky dressing, take caution not to compress eyeball or orbital bones. • Look for entrance and exit wounds	See for more details: • POM – Head, Face & Neck – Mgmt. of ALL Head, Face & Neck • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines
Head injury • Closed Head injury	• No Primary Intervention • C-spine consideration	See for more details: • POM – Head, Face & Neck – Mgmt. of ALL Head, Face & Neck • Fluid Resuscitation Protocol & Guidelines • Intracranial Pressure (ICP) Protocol
Head injury • Impaled Head injury	• Control Moderate to Major hemorrhage with direct pressure • C-spine consideration • Manually support impaled object in place • Look for entrance and exit wounds	See for more details: • POM – Head, Face & Neck – Mgmt. of ALL Head, Face & Neck • Fluid Resuscitation Protocol & Guidelines • Intracranial Pressure (ICP) Protocol • Tranexamic Acid (TXA) Protocol & Guidelines
Head injury • Open Head injury	• Control Moderate to Major hemorrhage with direct pressure • C-spine consideration • Loosely cover with sterile dressings	See for more details: • POM – Head, Face & Neck – Mgmt. of ALL Head, Face & Neck • Fluid Resuscitation Protocol & Guidelines • Intracranial Pressure (ICP) Protocol • Tranexamic Acid (TXA) Protocol & Guidelines

Traumatic injuries Indication	Rapid Assessment	Further Treatment/Packaging of Intervention
Head injury • Penetrating Head injury	• Control Moderate to Major hemorrhage with direct pressure • C-spine consideration • Look for entrance and exit wounds	See for more details: • POM – Head, Face & Neck – Mgmt. of ALL Head, Face & Neck • Fluid Resuscitation Protocol & Guidelines • Intracranial Pressure (ICP) Protocol
Limb Injury • Amputations	• Major bleed = use a gloved hand w/ direct pressure • Moderate bleed = use a dressing w/ direct pressure	See for more details: • POM – Extremities - Mgmt. of ALL Extremities • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines • Pain Management Protocol & Guidelines
Limb Injury • Closed Fractures	• Manual stabilization, above and below injury • Realign pale, cool, pulseless limbs • Observe for signs of internal hemorrhage	See for more details: • POM – Extremities - Mgmt. of ALL Extremities • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines • Pain Management Protocol & Guidelines
Limb Injury • Impaled object	• Control Moderate to Major hemorrhages as per the BCEHS Handbook - Clinical Practice Guidelines - H01: Principles of Major Trauma • Manually support impaled object in place • Look for entrance and exit wounds	See for more details: • POM – Extremities - Mgmt. of ALL Extremities • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines • Pain Management Protocol & Guidelines
Limb Injury • Joint w/ Pale, cool, pulseless distal	• Manual stabilization, above & below injury • Realign if all three criteria below are present: – Marked angulation at the joint. – Distal limb is pale, cool, & pulseless. – Treatment & transport time is greater than 30 minutes from hospital	See for more details: • Pain Management Protocol & Guidelines WARNING: Not all joints will be realigned in the field.
Limb Injury – Long bone w/ Pale, cool, pulseless distal	• Manual stabilization, above and below injury • Realign to anatomical IF grossly angulated	See for more details: • POM – Extremities - Mgmt. of ALL Extremities • Pain Management Protocol & Guidelines

Traumatic injuries Indication	Rapid Assessment	Further Treatment/Packaging of Intervention
Limb Injury • Open Fractures	• Manual stabilization, above and below injury • Control Moderate to Major hemorrhages as per the BCEHS Handbook - Clinical Practice Guidelines - H01: Principles of Major Trauma	See for more details • POM – Extremities - Mgmt. of ALL Extremities • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines • Pain Management Protocol & Guidelines
Neck • Anterior Neck laceration	• Control Moderate to Major hemorrhages as per the BCEHS Handbook - Clinical Practice Guidelines - H01: Principles of Major Trauma, take caution not to compress airway • Apply occlusive dressing as soon as functional • Pay special attention to airway assessment and management	See for more details: • POM – Head, Face & Neck – Mgmt. of ALL Head, Face & Neck • Hemorrhage Control Protocol & Guidelines • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines
Neck • Impaled Neck injury	• Control Moderate to Major hemorrhages as per the BCEHS Handbook - Clinical Practice Guidelines - H01: Principles of Major Trauma, take caution not to compress airway • C-spine consideration • Manually support impaled object in place • Pay special attention to airway assessment and management	See for more details: • POM – Head, Face & Neck – Mgmt. of ALL Head, Face & Neck • Fluid Resuscitation Protocol & Guidelines • Tranexamic Acid (TXA) Protocol & Guidelines

Guidelines for IV Therapy

IV access is a skill and potential treatment for patients 1 year and older. By learning the principles of IV initiation, you are gaining knowledge to apply now and in the future.

Two common administration sets used are 10 gtts/ml and 60 gtts/ml. To calculate flow rates, the following formula is used:

$$\text{gtts per minute} = \frac{\text{volume to be infused (ml)} \times \text{drop factor (gtts/ml)}}{\text{rate time (mins)}}$$

Examples:

To infuse 500 ml normal saline over 12 hours using a macro-drip set (10 gtts/ml):

$$\frac{500 \text{ ml} \times 10 \text{ gtts/ml} = 5000}{12 \text{ hours} \times 60 \text{ min} = 720} = 7 \text{ gtts/min}$$

To infuse 25 ml 5% D10W in 60 minutes using a micro-drip set (60 gtts/ml):

$$\frac{25 \text{ ml} \times 60 \text{ gtts/ml} = 1500}{60 \text{ min} = 60} = 25 \text{ gtts/min}$$

IV Maintenance

1. Ensure that the appropriate solution is running.
2. Calculate and maintain the appropriate flow rate.
3. Monitor flow rate and amount of solution.
4. Reassess patient condition and IV on a regular basis (i.e. q 5 – 15):
   - Reassess Airway, Breathing and Circulation (ABCs) and injury sites
   - Reassess vital signs
   - Inspect IV site, tubing, and solution bag
   - Observe for complications and take appropriate measures as necessary
   - Maintain appropriate flow rate
   - Change solution bag if required

1. Intravenous solutions that can be maintained at TKVO (To Keep Vein Open) rates as defined by the transporting hospital for the purpose of interfacility transfers, include:
   - Normal Saline
   - 2/3 - 1/3
   - Ringers Lactate
   - D10W
2. Some protocols may contain a reference to a maintenance rate. Current JIBC Training Protocols use the following values for maintenance rate:
   - Normal Saline (N/S): 75 mL/hr
   - D10W: 100 mL/hr

Paramedic Communications

Communication is an ongoing process of improvement between Paramedics and the wider healthcare community whether that is through medical direction, hospital notification or clinical handover to receiving staff.

To create a simplified shared model between all agencies is key to ensuring a smooth communication system, effective succinct clinical handover and ensure safe clinical care.

Medical Direction / Paramedic Specialist Support

SBAR is a simplified tool designed for use in telephone consultation with Medical Direction and / or Paramedic Specialist.

SBAR	Call Simulation
S Situation	
Caller ID	"Hi I'm Adam Swan, PCP in Madeira Park on 265KN."
Reason for call	"I'm calling for discontinuation orders for a 52 year old male in cardiac arrest."
Concerns	"We are 45 mins from the closest hospital."
B Background	
Time of onset	"The patient had a witnessed collapse at 1945 with immediate bystander CPR."
Chief complaint	"The wife states he had complained of chest pain just prior to collapse"
History of chief complaint	"...and he has had episodes of SOB on exertion for the past week."
Pertinent medical history	"Medical history includes hypertension and diabetes."
A Assessment	
General impression	"The patient has been in cardiac arrest for 35mins now with no shocks advised."
Vital signs	"He has been pulseless and apneic for the duration of the call."
Physical findings	"On exam the patient is peripherally cyanotic with fixed and dilated pupils."
Treatment provided	"He has an airway device in place, and a total of 9 no shocks advised on the AED."
R Recommendation	
Restate reason for call	"To confirm, I would like to discontinue CPR at this time."
Discuss treatment plan and options	"We have had no response to treatment and have a long transport time to the closest hospital. We believe any further efforts would be futile. Do you have any further questions or advice?"

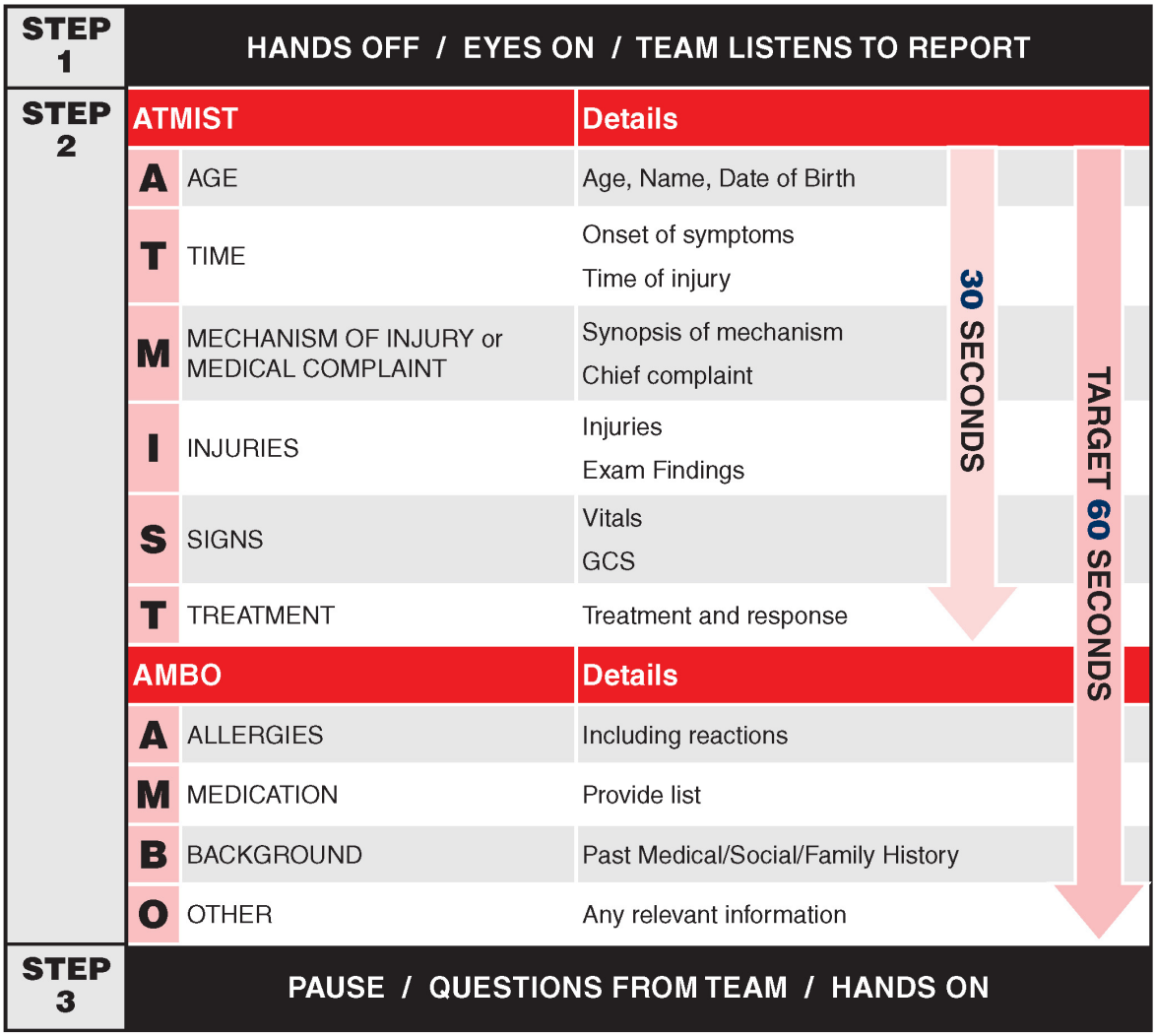
Version 8 Last updated: Apr 18, 2018

Patient Handover

In order to provide a safe and effective clinical handover, Paramedics are encouraged to follow the internationally recognized method of handover using the ATMIST-AMBO tool:

- Age
- Time of onset / incident
- Mechanism of Injury or Chief Complaint
- Injuries or information relating to the complaint
- Signs, including vitals
- Treatments provided

- Allergies
- Medications
- Background health history
- Other pertinent information



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Principles of Management

How to Use the Principles of Management

This section contains Principles of Management for common injuries and conditions that you will encounter as a paramedic. These Principles of Management integrate the equipment, treatments, and protocols that are part of your Primary Care Paramedic scope of practice.

For this program, you will learn, master and use the following Principles of Management. **When you find disagreements between various content resources, follow these guidelines; all of your written and practical evaluations will be based on these.**

Priority Patient

Transport the Priority patient immediately after the initial assessment except unless indicated by protocol.

Non – Priority Patient

Transport the Non-Priority patient after all treatments & protocols are complete. You may assess & manage a Non-Priority patient on scene if MOI indicates minor or superficial injuries. It is important to constantly monitor patient & be prepared to transport if there is any change in their condition.

Medical Management

Abdominal Pain

Management of Abdominal Pain

Assessment

- Rapid Assessment expose & examine the abdomen. Palpate & inspect for signs of trauma.
- Consider the position patient based on comfort. Position of comfort (knees bent) may reduce pressure on the abdomen.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Pain Management Protocol (if indicated).
- Nausea & Vomiting Protocol (if indicated).

Events leading up for Abdominal Pain

Note the following:

- Obtain an OPQRST
- Note any previous episodes and compare to current episode
- Note last meal/oral intake
- Note last BM & any abnormalities
- Note urinary function & any abnormalities
- Note if any nausea and/or vomiting.
- Note colour/consistency of emesis

Medications

- Note any medications, including recent changes in medication and compliance.

Past Medical History

- Note any underlying medical conditions

Last Oral Intake

- Note the time for the last oral intake and what they ate or drank.

The following is the specific treatments of:

- Abdominal pain

Abdominal pain

- Refer to Protocol and Protocol Guidelines
- Refer to *BCEHS Handbook* for drug monographs for Indications, Contraindications & Dosages of medications.
- Anticipate vomiting while moving the patient.
- Ensure continual assessment of pain & associated symptoms is complete with required vital signs

Anaphylaxis

Management of Anaphylaxis

Assessment

- Rapid Assessment expose & examine the chest & back.
  - Inspect for urticaria &/or angioneurotic edema.
  - Inspect for signs of injectable allergen (remove stinger if found & apply cold to site).
  - Inspect for signs of respiratory distress (accessory muscle use, retractions, increased work of breathing, etc.).
  - If the patient is SOB, auscultate a minimum of 6 points and document your findings.
- Position hypotensive patients supine

The *Anaphylaxis Protocol* will outline when to initiate transport.

Protocol(s)

- Anaphylaxis Protocol (if indicated).

Events leading up for Anaphylaxis

Note the following:

- Note the history of exposure to an allergen (intubation, onset of symptoms of last exposure).
- Note the time and route of exposure.
- Note the onset of symptoms.

Allergies

- Note any allergies to medication.
- Note any other allergies.

Medications

- Note the patient's medications.
- Note any change in medication.

Past Medical History

- Note the history of any previous anaphylactic reaction. (Was the patient hospitalized? Did the patient receive epinephrine?)

Last Oral Intake

- Note the time for the last oral intake and what they ate or drank.

The following is the specific treatments of:

- Allergic Reaction
- Life threatening Anaphylaxis

Allergic Reaction / Life Threatening Anaphylaxis

- Refer to Protocol and Protocol Guidelines
- Refer to *BCEHS Handbook* for drug monographs for Indications, Contraindications & Dosages of medications.
- Monitor patient for developing hoarseness, stridor or SOB.
- For a resolved allergic reaction, patient may be deemed Non-Priority. Continue transport & vitals q 15 minutes.

Cardiac Arrest

Management of Cardiac Arrest

Assessment

- Assess carotid pulse for a maximum of 10 seconds.
- If no pulse, immediately start chest compressions (see Cardiac Arrest protocol guidelines for rates)
- Attach AED and analyze rhythm (see Cardiac Arrest protocol for more details)
- Open airway & ventilate using BVM.
- Insert airway adjunct as soon as practical
- Connect high flow O2 at 15 lpm as soon as practical.
- Rapid Assessment - expose & examine injuries, intervene at each injury as per Intervention List.
- Ensure compressor changes every 2 minutes (may switch at each 'ANALYZE').
- Request additional resources (FR's, ACP, additional PCP, etc.).
- Once initial assessment has been completed consider insertion of an extraglottic device. Continue with 30 to 2 compressions.

Load and Transport

- The Cardiac Arrest Protocol will be initiated on scene; refer to protocol on when to transport.
- Request additional resources (FR's, ACP, additional PCP, etc.).
- Handle the patient gently; communicate with your partner/team prior to any movement of the patient.
- Utilize lifting device to minimize movement of the patient (clamshell).
- Leave the AED attached to the patient until arrival at hospital.
- Continue CPR as required during transport, minimize interruptions to CPR.

Protocol(s)

- Cardiac Arrest Protocol – Medical (if indicated)
- Cardiac Arrest Protocol – Trauma (if indicated)
- Cardiac Arrest Protocol – Newborn (if indicated)
- Cardiac Arrest Protocol – Pediatric (if indicated)

The following is the specific treatment of:

- Cardiac Arrest

Cardiac Arrest

- Refer to Protocol & Protocol Guidelines
- Refer to the PCP Skills Checklists for Cardiac Arrest Management.

	Ratio	Rate	Depth
Adult	30:2	100 min	5 - 6 cm
Newborn/Child	15:2	100 min	4 - 5 cm
Neonate	3:1	100 min	4 cm
After intubation	CCC	100 min	As above

Post Arrest Care

- Continual assessment of ABC's including any interventions that were introduced (Adjuncts, EGD placement)
- Anticipate re-arrest & preparation of resuscitation equipment
- Begin focused history and physical examination & critical history

Chest Pain

Management of Cardiac Chest Pain

Assessment

- Rapid Assessment - expose & examine the chest. Palpate & inspect for signs of trauma.
  - Inspect for signs of previous cardiovascular intervention.
  - Consider respiratory causes of chest pain / musculoskeletal
- Consider the position patient based on position of comfort.

The Cardiac Chest Pain Protocol will outline when to initiate transport.

Protocol(s)

- Cardiac Chest Pain Protocol (if indicated).
- Pain Management Protocol (if indicated).
- Nausea & Vomiting Protocol (if indicated).

Events leading up for Cardiac Chest Pain

Note the following:

Note the use of nitroglycerin or other cardiac or respiratory medications and compliance, especially the following;

- Obtain an OPQRST.
- Compare current chest pain to previous episodes.
- Note any Allergies

Medications

Note the use of nitroglycerin or other cardiac or respiratory medications, especially the following:

- platelet inhibitors (ASA, Plavix) / blood thinners (Coumadin, warfarin)
- cardiac medications (beta blockers, ACE inhibitors, digitalis, antiarrhythmics, etc.)
- diuretics (Lasix)

Past Medical History

Note any history of the following disorders:

- hypertension
- diabetes
- previous myocardial infarction or heart failure
- pulmonary disease

Last Oral Intake

- Note the time for the last oral intake and what they ate or drank.

The following is the specific treatment of:

- Cardiac Chest Pain

Cardiac Chest Pain

- Refer to Protocol and Protocol Guidelines
- Refer to *BCEHS Handbook* for drug monographs for Indications, Contraindications & Dosages of medications.

Hypo or Hyper Glycemic Events

Management of Hypo or Hyper Glycemic Emergencies

Assessment

- Rapid Assessment - visualize, palpate, & auscultate where appropriate.
  - Inspect for medical alert jewelry.
  - Inspect for diabetic apparatus (e.g. insulin pumps and glucose monitoring sensors)
- Consider the position patient based on mental status & airway patency.

The Hypo or Hyper Glycemic Event Protocol will outline when to initiate transport.

Protocol(s)

- Hypo or Hyper Glycemic Event Protocol (if indicated).

Events leading up to Hypo or Hyper Glycemic Emergencies

Note the following:

- Note the onset of symptoms (gradual or sudden).
- Note recent food intake, insulin use and changes in activity.
- Note any treatments/medications prior to EMS arrival.
- Note any recent illnesses.

Medications

- Note the use of insulin or oral hypoglycemics.
- Note any recent changes in medication and compliance.

Past Medical History

- Note any history of diabetes.
- Note any cardiac or respiratory disorders.
- Note length of time being diabetic, type of diabetes.
- Note any complications of diabetes (HTN, circulation issues, etc.).
- Note any patient records of blood glucose level and medication doses.

Last Oral Intake

- Note the time for the last oral intake and what they ate or drank.

The following is the specific treatment of:

- Hyperglycemia / Hypoglycemia

Hyperglycemia / Hypoglycemia

- Refer to Protocol and Protocol Guidelines
- Refer to *BCEHS Handbook* for drug monographs for Indications, Contraindications, & Dosages of medications.
- Ensure GCS assessment is done prior to any medication administration.
- For resolved hypoglycemia, patient may be deemed Non-Priority. Continue transport & vitals every 15 minutes.

Environmental

The following events fall under the Environmental title.

- Heat Emergencies
- Cold Emergencies
- Water Emergencies

Recognize environment danger & ensure appropriate PPE worn by attendant & partner. The goal of care is to prevent further heat loss.

Management of Heat Emergencies

Assessment

- Rapid Assessment - visualize, palpate, & auscultate where appropriate.
- Intervene at each injury as per Intervention List.
- Ensure patient is moved to a cool environment, in position of comfort.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Nausea & Vomiting Protocol (if indicated).

Events leading up for Heat Emergencies

Note the following:

- Note the environment (especially temperature and humidity).
- Note length of time in environment.
- Note the patient's activities.
- Note recent fluid intake.
- Note approximate fluid loss or pre-disposition to dehydration.
- Note any treatment done prior to EMS arrival.

The following is the specific treatment of:

- Heat Cramps
- Heat Exhaustion
- Heat Stroke

Heat Cramps:

- Consider giving the patient small amounts of fluids such as water or sports drinks. Sports drinks are preferred as they will replenish sodium losses.
- Do not massage cramping muscles.
- If patient is nauseated, initiate an IV N/S.

Heat Exhaustion:

- Remove excess clothing.
- Sponge, spray or drip the patient with tepid water & fan gently to make the patient more comfortable.
- Consider fluid & electrolyte replacement with sports drink or IV N/S.

Heat Stroke:

- Rapid cooling should be initiated in the initial assessment. Cooling can be accomplished by removing the patient's clothing & spraying the patient with tepid water.
- Constantly fan the patient to promote evaporation.
- Place ice packs in the patient's groin, neck & axilla regions.
- Monitor the patient to prevent shivering as this will increase the body temperature (goal is to achieve a core temperature < 39 degrees).
- Do not give anything to patient by mouth.
- Initiate an IV N/S.
- Anticipate a deterioration in the patient condition and possible seizure activity.

Management of Cold Emergencies

Assessment

- Rapid Assessment - visualize, palpate, & auscultate where appropriate.
- Intervene at each injury as per Intervention List.
- Ensure patient is removed from cool environment, in position of comfort.

Protocol(s)

- Pain Management Protocol (if indicated).
- Fluid Resuscitation Protocol (if indicated).

Events leading up for Cold Emergencies

Note the following:

- Note the nature of the environment (temperature, weather – rain, snow, sun, wind chill).
- Note the type and condition of the patient's clothing (e.g. wet, dry).
- Note the length of the patient's exposure to the elements and any shelter the patient had.

The following is the specific treatment of:

- Superficial Frostbite
- Deep Frostbite
- Mild Hypothermia
- Moderate Hypothermia
- Severe Hypothermia

Superficial Frostbite:

- Rewarm the injured part with body heat. Do not rub or massage the frostbitten area.
- Cover blisters with a dry sterile dressing to protect the area.
- Place non-stick dressing between any digits involved.

Deep Frostbite:

- Consider associated hypothermia with deep frostbite.
- Cover blisters with a dry sterile dressing to protect the area.
- Place non-stick dressing between any digits involved.
- Consider rewarming the part based on 3 criteria below. If you are not rewarming, protect the part & insulate with blankets to prevent further warming or cooling.

Prior to rewarming the injury, all three criteria below must be present:

1. You have the resources required to rewarm the part, ensuring there is no possibility of refreezing.
2. Contact Medical Direction for orders based on critical history & findings.
3. Treatment & transport time is greater than 30 minutes from hospital.

Mild Hypothermia:

- Passive rewarming: Move patient to heated area, remove wet clothes, gently pat dry the skin, use warm blankets or reflective space blankets.
- Consider giving the patient small amounts of warm/hot liquids by mouth

Moderate Hypothermia:

- Passive rewarming.
- Active rewarming: Place hot packs to rewarm the "core" (chest, back, groin, neck & axilla regions).
- Introduce warmed IV N/S fluid.
- Recognize "uncontrolled shivering" & anticipate a decrease in mental status.

Severe Hypothermia:

- Use extreme care when handling patient.
- Keep patient supine.
- Assess circulation up to 60 seconds, when determining a need for CPR.
- Do not actively rewarm the patient.
- Maintain room temperature in ambulance compartment.

Management of Water Emergencies

Consider need for spinal motion restriction

Assessment

- Rapid Assessment - visualize, palpate & auscultate where appropriate.
- Intervene at each injury as per Intervention List.
- Ensure patient is moved to a warm environment, in position of comfort.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).

Events leading up for Near–Drowning

Note the following:

- Note the location where the patient was found (e.g. in a lake, fresh or salt water, in a pool, near a stream, etc.).
- Note the position the patient was found in.
- Note any evidence or history of trauma.
- Note the length of time the patient was submerged (if known).
- Note the temperature of the water.
- Note the initial condition and presentation of the patient.
- Note the resuscitation efforts performed before your arrival.
- Note events leading up to near-drowning.

The following is the specific treatment of:

- Drowning
- Near-Drowning

Drowning / Near Drowning

- Prioritize ventilations over oxygenation.
- Based on the environment, anticipate heat or cold emergencies.
- Consider CPAP for patients who remain SOB with low SpO2 and no DLOC.
- Perform fracture & wound management as required.

If patient is in cardiac arrest, consider MOI to determine causes of cardiac arrest and ensure patient is warm prior to discontinuing resuscitation.

Neurological

The following events fall under the Neurological title.

- Unconscious Patients
- Seizures
- TIA / CVA

Management of Unconscious Patients - Unknown Cause

Assessment

- Rapid Assessment - expose & examine injuries - visualize, palpate, & auscultate where appropriate.
- Intervene at each injury site as per Intervention List.
- Position the patient supine or ¾ prone, depending on spinal precautions.

The *Altered Mental Status Guidelines* will outline when to initiate transport.

- Vital Signs should include Blood Glucose Level & PUPIL assessment.

Protocol(s)

- Altered Mental Status Guidelines

Events leading up for Unconscious Patients

Note the following:

- Note length of unconsciousness.
- Note onset (gradual or sudden).
- Note presence of seizure activity.
- Note any complaint of pain or unusual presentation prior to decreased mental status.

Past Medical History

- Medications
- Note previous or recent history of neurological or cardiac disorders. Note use or history of alcohol or drug use.
- Note history of recent head injury. Note any diabetic medical history. Note possibility of pregnancy.
- Note the use of cardiac or neurological medications. Record any change in medication or compliance.

Last Oral Intake

- Note the time for the last oral intake and what they ate or drank.

The following is the specific treatment of:

- Unconscious Patients

Unconscious Patients

- Refer to Protocol and Protocol Guidelines
- Refer to *BCEHS Handbook* for drug monographs for Indications, Contraindications, & Dosages of medications.
- Monitor patient's airway & respiratory effort constantly.
- Utilize 'AEIOU-TIPS' to formalize thoughtful differential diagnosis.

Management of Seizure(s)

Ensure patient safety by clearing objects & furniture from around them.

Assessment

- Rapid Assessment - visualize, palpate, & auscultate where appropriate.
- Intervene at each injury site as per Intervention List.

If the postictal patient is regaining consciousness, patient may be deemed Non-Priority.

- Vital Signs should include Blood Glucose Level & PUPIL assessment.

Protocol(s)

- Altered Mental Status Guidelines (if indicated).

Events leading up for Seizure(s)

Note the following:

- Note the nature of the seizure (generalized or focal).
- Note the duration of seizure.
- Note any preceding symptoms (e.g. presence of an aura).
- Note any trauma during the seizure from falling or collision with objects.
- Note any complaints of feeling unwell recently.

Medications

- Note the use of anti-convulsant medication.
- Note recent compliance or any change in medication.

Past Medical History

- Note the past history of seizures.
- Note any history of hypertension, head injury, CVA, fever, drug and alcohol abuse, diabetes or other disorders.

Last Oral Intake

- Note the time for the last oral intake and what they ate or drank.

The following is the specific treatment of:

- Seizure(s)

Seizure(s)

- If en route there are suspected treatable causes for the seizure activity,
- Refer to Protocol and Protocol Guidelines
- Refer to *BCEHS Handbook* for drug monographs for Indications, Contraindications & Dosages of medications.
- Monitor patient's airway.
- Do not put your fingers in the patient's mouth or attempt to insert an OPA **while the seizure is in progress.**
- Be aware that bright or flashing lights, loud noises, or rough handling may trigger subsequent seizures.
- Utilize 'AEIOU-TIPS' to formalize thoughtful differential diagnosis

Management of TIA or CVA

Assessment

- Rapid Assessment - visualize, palpate & auscultate where appropriate.
- Intervene at each injury site as per Intervention List
- Consider the position based on the supine or ¾ prone, depending on spinal precautions.

If the TIA is completely resolved, patient may be deemed Non-Priority.

- Vital Signs should include Blood Glucose Level & PUPIL assessment.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated)
- Intracranial Pressure (ICP) Protocol (if indicated)

Events leading up for TIA or CVA

Note the following:

- Compare CVA to previous episodes (if any).
- Note any recent episodes of symptoms.
- Note the time of the onset of symptoms.
- Note whether onset of symptoms was gradual or sudden.

Medications

- Note the use of anti-hypertensive medications; record any change in medication or compliance.

Past Medical History

- Note previous or recent history of CVA, hypertension, enforced bed rest, cardiac or respiratory disorders.
- Note any Hx of diabetes.

Last Oral Intake

- Note the time for the last oral intake and what they ate or drank.

The following is the specific treatment of:

- Transient Ischemic Attack (TIA)
- Cerebral Vascular Accident (CVA)

TIA/CVA

- Accurate recognition, timely scene management, transport, & notification are key principles in caring for stroke patients. As soon as possible, utilize the pre-hospital stroke tool: FAST-VAN.
- **Face**: Right droop? Left droop?
- **Arms**: Right arm drift? Left arm drift?
- **Speech**: Slurred?
- **Time**: < 6 hours or woke up with symptoms?

If any abnormality in face, arm, or speech are seen & the patient was last seen normal less than 6 hours ago, or before bed, consider the patient as a hot stroke candidate.

Additional assessment includes:

- **Vision**: Right gaze? Left gaze?
- **Aphasia**: Naming difficulties?
- **Neglect**: Ignoring left body?
  - 'YES' to any of the above questions – notify the hospital of a possible large vessel occlusion.
  - Conduct a neurological assessment, such as FAST-VAN, as early as possibly & re-visit throughout the call.

Ongoing:

- Initiate an IV N/S – preference is 18 or 20 gauge above the hand.

Obstetrics and Neonatal Care

Management of Childbirth in the Field

If the history and physical examination indicate the ability to make it to the closest hospital, position the patient left lateral, remove any underclothes that may obstruct delivery, and initiate transport.

Assessment

- Rapid Assessment.
- Intervene at each injury as per Intervention List.
- Consider the position for comfort.

Prepare to assist the delivery of the baby at scene if:

- Based on previous deliveries, the birth is expected to be quick.
- Presence of true contractions, regularly spaced, increasing in intensity, & less than 2 minutes apart.
- There is an urge to push. Crowning is present.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Pain Management Protocol (if indicated).
- Tranexamic Acid (TXA) Protocol (if indicated for postpartum hemorrhage).

The following is the specific treatment of:

- Normal childbirth in the field
- Breech presentation
- Other Abnormal Presentations

Normal childbirth in the field

- Attempt to attend to the emotional needs of the mother, stay calm.
- Make all attempts to ensure a sterile environment for the delivery.
- Inspect for crowning if there is any signs of true labor.
- Consider & anticipate possible complications based on history and presentation.
- For Obstetrics & Neonatal care, follow the PCP Skills Checklists:

Breech Presentation

- Position the woman with her buttocks at the edge of the bed.
- Allow baby to deliver spontaneously, do not pull on baby.
- Support the anatomy that has been delivered with your hands & forearms.
- If the baby's head has not delivered with the body & there is fear of suffocation, place your gloved hand on the vagina, palm towards baby's face. Using 2 fingers form a "V" on the baby's face to apply gentle flexion of the neck.

Other Abnormal Presentation (Prolapsed umbilical cord or limb presentation).

- Do not attempt to deliver in the field.
- Support any limb or cord presentation.
  - Apply warm, moist, sterile dressings to the visible cord.
- Position patient with pelvis elevated, slightly on left side

Neonatal Resuscitation

A neonate is described as a newborn infant up to 28 days old, which has recently undergone the transition from intrauterine to extrauterine life. Approximately 10%[1] of newborns require some assistance to begin breathing at birth and less than 1% require extensive resuscitative measures. Neonatal resuscitation is a reality of prehospital emergencies. Therefore, understanding the physiological changes and associate principles of management is crucial. The preferable location of childbirth will always be the hospital. However, this isn't always an option, so our role should always be to assess, treat if needed and transport.

Birth is comprised of a series of physiological changes. The fetus is oxygenated by the placenta while the lungs are filled with fluid with very little blood flow through the pulmonary blood vessels due to increased pulmonary arterial resistance. Therefore, the majority of blood bypasses the lungs through the ductus arteriosus (connecting the pulmonary artery to the aorta), which offers a lower path of resistance. After birth, the placenta will cease to provide oxygenation and the baby must now depend upon pulmonary ventilation to oxygenate. In a matter of seconds the fluid within the lungs is absorbed from the alveoli, the lungs fill with air, the blood vessels in the lungs decrease in resistance (due to pulmonary vasodilation) and redirect blood flow to the pulmonary circuit, and oxygen is absorbed and transported to the rest of the body. These physiological changes occur at 'first breath', referred to as spontaneous respiration. Various problems can occur with this process. Close assessment is required to assess what needs to be treated.

For the most part, babies are born healthy. Upon delivery, but prior to spontaneous respiration, a newborn should appear cyanotic. Shortly after, they will start to pink up centrally. Interestingly, the arms and legs typically stay cyanotic for the first 24-48 hours. This peripheral cyanosis is normal and is known as acrocyanosis.

The newborn should be crying, indicating adequate respirations. To assess circulation, auscultate the chest for the heart rate; newborns should be above 100 beats/min. The baby should appear active with good muscle tone and should react to stimulus. Any deviation from these normal parameters could indicate a problem. The APGAR Assessment tool is beneficial here, this will identify trends in improvement or deterioration.

For the most part, vaginal delivery runs its own course based upon autonomic functions and hormonal regulation. As the neonate is born, it doesn't take long for them to become hypothermic. This is partly due to the newborn being wet, with a large surface-to-mass ratio, and not able to effectively thermoregulate. Dry off the baby with warm towels as soon as possible. This also provides stimulus and helps to assess the infants tone and reactivity. Wipe the face, mouth and nose of any fluid and do not suction the oropharynx[2]. However, suctioning is indicated when there is a clear obstruction to spontaneous respiration and when positive pressure ventilation is required. There is research promoting delayed cord clamping, showing that immediate cord clamping results in a 20% reduction in blood volume for the neonate and up to a 50% reduction in red blood cell volume3[3]. The research suggests delaying cord clamping/cutting for up to 10 minutes but not earlier than 1 minute post-delivery. However, if resuscitation is necessary then clamp/cut the cord immediately and begin resuscitation. Once dried and assessed, wrap the baby in a warm blanket if possible, but allow skin-on-skin contact with the mother. This helps with thermoregulation for the newborn and has a variety of other positive benefits.

Where neonatal resuscitation is needed, it's important to determine the general etiology of the event so that the correct response can be initiated. If the arrest is asphyxial in nature, then the focus should be on increased oxygenation. Perform a compression to ventilation ratio of 3:1 which works out to 90 compressions and 30 breaths/minute. If the arrest is cardiac in nature, then the focus should be on a higher compression to ventilation ratio. Utilise the 15:2 (for 2-rescuers).

1 Wyckoff MH, Aziz K, Escobedo MB, Kapadia VS, Kattwinkel J, Perlman JM, Simon WM, Weiner GM, Zaichkin, JG. Part 13: neonatal resuscitation: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2015;132(suppl 2):S543–S560.
2 Kelleher J, Bhat R, Salas AA, et al. Oronasopharyngeal suction versus wiping of the mouth and nose at birth: a randomised equivalency trial. Lancet. 2013;382(9889):326-330. doi:10.1016/S0140-6736(13)60775-8
3 Yao AC, Moinian M, Lind J. Distribution of blood between infant and placenta after birth. Lancet. 1969;2(7626):871-873. doi:10.1016/s0140-6736(69)92328-9

For the most part, childbirth will take its natural course and you'll be welcoming a new life into the world. It's a privilege to assist with such an event.

Remember to be **calm and collected.** It's easy to forget the parameters around neonatal care if you're preoccupied with fear or nerves.

Be respectful. You must maintain your patient's dignity while on scene, especially while the mother is in such a vulnerable state.

Be professional. This is a significant event for the patient and their family, and you will be a part of that memory. Remember, neonatal care is a matter of practice, memorization, and utilization of educational resources. This will allow you to enter these types of calls with confidence and competence.

Shortness of Breath

Management for Shortness of Breath

Assessment

- Skin assessment and SPO2
- Rapid Assessment - expose & examine the chest. Palpate & inspect for signs of trauma.
- Apply O2 (Non-Rebreather Mask).
- Consider the position patient based on ease of breathing.
- The Shortness of Breath Protocol will outline when to initiate transport.

Protocol(s)

- Shortness of Breath Protocol (if indicated).

Events leading up for Shortness of Breath

Note the following

- Compare breathing problems to previous episodes.
- Note previous hospitalizations and severity.
- Auscultate min 6 points.
- Note cause of onset.
- Note length of episode.

Allergies

- Note any allergies.
- Note any other allergies and consider the possibility of an allergic or anaphylactic reaction.

Medications

- Note the use of inhalers or other medications associated with respiratory or cardiac disorders.
- Note compliance or any change in medication.

Past Medical History

- Note any previous history of respiratory or cardiac disorders.

The following is the specific treatment of:

- Shortness of Breath

Shortness of Breath

- Refer to Protocol and Protocol Guidelines
- Refer to *BCEHS Handbook* for drug monographs for Indications, Contraindications & Dosages of medications.
- Encourage the patient to cough up any secretions.
- Ensure respiratory assessment is done prior to any medication administration.
- Consider assisting ventilations if patient does not improve with Salbutamol.
- Consider CPAP for patients who remain SOB with low SpO2 despite protocol treatments.
- Be aware of PEEP devices that can provide it, and which patients will benefit from it.

Toxicological

The following events fall under the Toxicological title.

- Poisoning
- Severe Alcohol Intoxication
- Drug Abuse / Overdose
- Narcotic Drug Overdose

Management of Poisoning

Assessment

- Rapid Assessment - visualize, palpate & auscultate where appropriate.
- Apply O2 (Non-Rebreather).
- Intervene at each injury site as per Intervention List.
- Vital Signs with Blood Glucose Level & pupil assessment.

Protocol(s)

- Altered Mental Status Guidelines (if indicated).
- Suspected Narcotic Overdose

Events leading up for Poisoning

Information obtained in critical history is paramount to initiate effective treatments. Contact provincial poison center (BC: 1-800-567-8911) for advice based on critical history & findings obtained. Treatment will be dependent on route of exposure.

Note the following:

- Note type of substance (if unknown, contact poison control).
- Note route of exposure.
- Note amount of exposure.
- Note time and duration of exposure.
- Note treatment or procedures done prior to EMS arrival.

Medications

- Note any medications, especially recent changes in medication or compliance.

Past Medical History

- If exposure is deliberate, determine if there is a previous history of substance abuse or previous attempts at suicide.

Last Oral Intake

The following is the specific treatment of:

- Dermal Poisoning
- Ingestion Poisoning
- Inhalation Poisoning
- Injection Poisoning

Dermal Poisoning– example: pesticides such as organophosphates.

Ingestion Poisoning– examples: medications, household cleaning agents, poisonous plants.

- Anticipate nausea & vomiting.
- Anticipate gastrointestinal discomfort.

Inhalation Poisoning– examples: household chemicals, carbon monoxide, chlorine gas, cyanide.

- Ensure scene safety, taking into account weather & wind.
- Consider reliability of Sp02 reading in carbon monoxide exposure.
- Anticipate required correction of hypoxia.

Injection Poisoning– examples: IV drugs, venomous species.

- For bites & stings, look for local reactions at the wound site.
- IV drug paraphernalia needs to be addressed as soon as possible as a potential hazard.

Management of Severe Alcohol Intoxication

Assessment

- Rapid Assessment - visualize, palpate & auscultate where appropriate.
- Apply O2 (Non-Rebreather).
- Intervene at each injury site as per Intervention List.
- Vital Signs with Blood Glucose Level & pupil assessment.

Protocol(s)

- Altered Mental Status Guidelines (if indicated).

Events leading up for Severe Alcohol Intoxication

Note the following:

- The amount and type of alcohol consumed
- The time in which it was consumed
- The presence of other drugs
- Any underlying illnesses

Allergies

- Note any allergies.

Medications

- Note any medications, especially recent changes in medication and compliance.

Past Medical History

- Note or rule out medical conditions frequently seen with alcoholic patients.
- Note any conditions that are potentially life-threatening: subdural hematoma, GI bleed, hypoglycemia, burns and hypothermia.

Last Oral Intake

- Note the time for the last oral intake and what they ate or drank.

The following is the specific treatment of:

- Severe Alcohol Intoxication

Severe Alcohol Intoxication

- Due to the toxic effects of alcohol there are several medical conditions that people with alcoholism are susceptible to. Consider contributing factors when forming thoughtful differential diagnosis.
- Consider police backup for safety.
- Do not let the smell of alcohol impair your judgement on the cause of illness.
- Be aware that alcohol use may mask medical conditions or use of other drugs.
- Anticipate vomiting & position patient appropriately.
- Based on critical history, anticipate withdrawal seizure activity.
- Based on critical history, recognize signs & symptoms of delirium tremens (DTs).

Management of Drug Abuse / Overdose

Assessment

- Rapid Assessment - visualize, palpate & auscultate where appropriate.
- Apply O2 (Non-Rebreather).
- Intervene at each injury site as per Intervention List.
- Vital Signs with Blood Glucose Level & pupil assessment.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated)
- Suspected Narcotic Overdose Protocol (if indicated)

Events leading up for Drug Abuse / and Suspected Overdose

Note the following:

- Type of drug taken
- Amount of drug taken
- Route taken
- How long ago
- Previous use of drug (is this more or less than the patient normally takes?)
- Note any previous reaction to use of the drug.

Medications

- Note the use of medication
  - Marijuana.
  - Stimulants – example: Cocaine & Amphetamine.
  - Hallucinogens – example: LSD, PCP, & Ketamine.
  - Sedatives & Hypnotics – example: Barbiturates, Benzodiazepines, & GHB.
  - Narcotics, Opiates & Opioids – Morphine, Codeine, Heroin, Fentanyl, & Oxycodone.
- Note any changes in medication or in compliance.

Past Medical History

- Note any underlying medical conditions.

The following is the specific treatment of:

Drug Abuse / Overdose

- Consider higher level of care due to potential arrhythmias.
- Anticipate vomiting & position patient appropriately.
- Be prepared to manage shock, coma, & seizures.
- Consider anticipation of hyperthermia for stimulant drug use.
- Consider IV access with N/S administration.
- Anticipate behavioral symptoms (anxiety, paranoia, & psychosis).

Management of Narcotic Drug Overdose

Assessment

- Assess & manage ABC's as required. Assist inadequate respirations.
  - Ventilate the non-breathing patient.
  - Maintain airways patency (manual adjunct).

- Skin assessment and SPO2
- Rapid Assessment - visualize, palpate & auscultate where appropriate. Assess pupil size & reactivity.
  - Inspect for drug injection sites.
- Apply O2 (Non-Rebreather or BVM).
- Consider the patient position based on respiratory intervention.
- The Suspected Narcotic Overdose Protocol will outline when to initiate transport.
- Vital Signs should include Blood Glucose Level & pupil assessment.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated)
- Suspected Narcotic Overdose Protocol (if indicated).

Events leading up for all Overdose

Note the Following:

- Type of drug taken
- Amount of drug taken
- Route taken
- How long ago
- Previous use of drug (is this more or less than the patient normally takes?)
- Note any previous reaction to use of the drug.

Medications

- Note the use of medication (prescribed, over-the-counter, or street drugs).
- Note any changes in medication or in compliance.

Past Medical History

- Note any underlying medical conditions.

Last Oral Intake

- Note the time for the last oral intake and what they ate or drank.

The following is the specific treatment of:

- Narcotic Overdose

Narcotic Overdose

- Refer to Protocol and Protocol Guidelines
- Refer to *BCEHS Handbook* for drug monographs for Indications, Contraindications & Dosages of medications.
- Consider an extraglottic device for patients with prolonged respiratory compromise, whose respirations do not improve with treatment.
- For resolved mental status or respiratory depression, patient may be deemed Non-Priority. Continue transport & vitals q 15 minutes.

Principles of Management: Influenza-Like Illness (ILI)

Influenza-Like Illness (ILI) is a broad category used casually to define patients who present with non-specific respiratory illness that could be infectious. In the pre-hospital setting the definition is used to describe a broad spectrum of signs and symptoms that may present infectious risk to providers. While a patient may present with ILI, the diagnosis in hospital may not be influenza. Causes of ILI could be gastroenteritis, rhinoviral disease, meningitis, respiratory syncytial virus, pneumonia, COVID-19, or even some pharmaceutical drugs.

When approaching the patient and conducting the Visual Inspection during the Initial Assessment, paramedics should look for two or more signs and symptoms such as the following.

- Fever or chills
- Shivering
- Sore Throat/ painful swallowing
- Malaise or Body Aches
- Cough (Dry or productive)
- Loss of appetite
- Nausea or vomiting
- Loss of sense of smell or taste

If patients present with any two or more of the above signs and symptoms, paramedics should don appropriate personal protective equipment (PPE) to provide direct patient care. This is of greater importance if the patient is:

- Unconscious
- Suspected Cardiac Arrest
- Presents with excessive bodily fluids
- Requires aerosol generating medical procedures

Appropriate PPE includes:

- N95 Respirator
- Eye protection
- Gown
- Gloves

Principles of Management: Intracranial Pressure (ICP)

Fluid Resuscitation Protocol for patients with Suspected Traumatic Brain Injury

The goal for a hypotensive TBI patient is to be cautious with fluid but to achieve a blood pressure high enough to ensure cerebral perfusion (target of SBP 120 mmHg or MAP of 85- 90). In most cases of isolated TBI the blood pressure will be elevated; however, these guidelines are for those multi-trauma situations where other body systems are affected as well.

Avoid obstructing venous return in the neck, loosen collars, ties, or any other obstructions around the neck.

All decreased level of conscious patient should have a BGL assessed.

National Early Warning Score (NEWS)2

It's widely known that the profession is now moving to a more robust system of not simply 'treat & transport', but developing a model to accommodate 'treat & refer' pathways within the PCP & ACP scope of practice. Currently within BCEHS, this pathway is focusing on Influenza Like Illness (ILI) & palliative care patients.

During practice, you will become exposed to the National Early Warning (NEWS) 2 scoring system.

This simple, aggregated scoring system works in a similar process to the Glasgow Coma Scale where a series of physiological signs are allotted a score from 0 - 21, the higher the number the more critically ill the patient potentially is. The score represents the level of acuity the patient is and guides the clinician on the level of response required.

For the NEWS2 to be utilized effectively, there are six simple physiological parameters form the basis of the scoring system:

1. respiration rate
2. oxygen saturation
3. systolic blood pressure
4. pulse rate
5. level of consciousness or new confusion
6. temperature.

For example: the patient has new-onset confusion, disorientation and/or agitation, where previously their mental state was normal – this may be subtle. The patient may respond to questions coherently, but there is some confusion, disorientation and/or agitation. This would score 3 or 4 on the GCS (rather than the normal 5 for verbal response), and scores 3 on the NEWS system.

A score is allocated to each parameter as they are measured, with the magnitude of the score reflecting how extremely the parameter varies from the norm. The score is then aggregated and uplifted by 2 points for people requiring supplemental oxygen to maintain their recommended oxygen saturation.

This is a pragmatic approach, with a key emphasis on system-wide standardization and the use of physiological parameters that are already routinely measured in NHS hospitals and in prehospital care, recorded on a standardised clinical chart – the NEWS2 chart

On the next pages, you will find the NEWS2 Score with information on the thresholds for care and escalation. It is important to recognise that this is an assessment tool to be used with safe clinical judgement and does not replace a thorough assessment of the patient.

When considering and 'treat and refer' strategy in your future practice, you must follow this guidance:

- Mandatory call to Medical Direction for secondary triage.
- Patient must be between 17 – 60 years old.
- Able to undertake self-care.
- Must have two full sets of vital signs.
- Must have a NEWS Score ≤ 3.

Contraindications:

- Younger than 16 or older than 61 years old
- Pregnant patients.
- Spinal cord injury patients.
- ANY Red flag identified during assessment.
- NEWS Score equal or greater than 4 in total.
- NEWS Score of 3 in any category.

The patient must be referred onto a primary care physician / health care professional for continued assessment and advised on what to do if their condition deteriorated.

References:

British Columbia Emergency Health Services (2020) ILI/COVID Clinical Pathway.

Reproduced from: Royal College of Physicians. National Early Warning Score (NEWS) 2: Standardising the assessment of acute- illness severity in the NHS. Updated report of a working party. London: RCP, 2017.

Trauma Management

Management of a non-Significant MOI Trauma

Consider need for spinal motion restriction.

Assessment

- Rapid Assessment - expose & examine injuries - visualize, palpate, & auscultate where appropriate.
- Intervene at each injury as per Intervention List.
- Focussed exam.

Protocol(s)

- Pain Management Protocol (if indicated).

The following is the specific treatments of:

- No Significant MOI Trauma calls

No Significant MOI Trauma calls

- Pain management protocol should be considered prior to definitive management of injuries.
- Monitor patient every 15 minutes for the Non-Priority patient.

Management of a Significant MOI Trauma & Multi-System Trauma

Consider need for spinal motion restriction.

Assessment

- Rapid Assessment - expose & examine injuries - visualize, palpate & auscultate where appropriate.
- Intervene at each injury as per Intervention List.

Following the initial assessment.

- Spinal motion restriction.
- Use minimize stabilization only for emergency extrication.
- To facilitate transport, stabilize fractures with straps & blankets.
- Continue with further assessment and treatment en route.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Intracranial Pressure (ICP) Protocol (if indicated)
- Pain Management Protocol (if indicated).
- Tranexamic Acid (TXA) Protocol (if indicated.)

Events leading up for a Blast Injury

Note the following:

- Type or cause of explosion.
- Size of explosion.
- Surrounding medium.
- Distance of patient from explosion.
- The presence or absence of reflecting surfaces.
- Loss of consciousness.

Events leading up for a Fall

Note the following:

- Where patient fell from.
- Height of fall.
- Whether patient free-fell or hit other objects during fall.
- Nature of landing surface.
- Position of patient at impact (i.e. what hit first.)
- Initial position and condition of patient.
- Any loss of consciousness.
- Cause of fall.

Events leading up for an MVI

Note the following:

- Location of patient.
- Which vehicle patient was in.
- How many vehicles were involved.
- Speed of vehicles.
- Interior and exterior damage.
- Type of restraints in use/airbags deployed.
- Initial position and condition of patient.
- Any loss of consciousness.
- Condition of other patients in the vehicle.

Events leading up for a Pedestrian Struck

Note the following:

- What hit the patient, including size, weight, and velocity of vehicle.
- What part of vehicle hit what part of the patient.
- Damage to vehicle.
- Distance patient was thrown.
- Initial position and condition of patient.
- Any loss of consciousness.

The following is the specific treatments of:

- Significant MOI Trauma & Multi-System Trauma calls

Significant MOI Trauma & Multi-System Trauma calls

- Monitor patient q 5 for the Priority patient.
- See specific injury POM

Blunt

The following events fall under the Blunt title.

- Management of Blunt Abdomen injuries
- Management of Blunt Chest injuries

Management of Blunt Abdomen Injuries

Consider need for spinal motion restriction.

.**Assessment**

- Rapid Assessment - expose & examine injuries.
  - Visualize and palpate all 4 quadrants for tenderness, guarding, pain, or masses.
  - Inspect for bruising, abrasions, or lacerations.
- Intervene at each injury as per Intervention List.
- Consider the position patient based on comfort; patient may want knees raised.
- Position hypotensive patients or patients under spinal precautions supine.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Pain Management Protocol (if indicated).
- Tranexamic Acid (TXA) Protocol (if indicated).

Events Leading up for Blunt Abdomen Injuries

Note the following:

- Force / mechanism involved i.e. what hit the patient, including size, weight and velocity.
- Note degree of forces involved (from height, object thrown)
- Location of patient at impact
- Note any loss of consciousness
- Obtain chief complaint
- Obtain patient's description of incident
- Note initial position and condition of patient
- Note the extent of injury
- Note presence of other injuries
- Obtain OPQRST
- Note if patient is nauseous or vomited

The following is the specific treatments of:

- Blunt Abdomen injury

Blunt Abdomen injury

- Be aware that abdominal trauma is often associated with chest trauma.
- Critical history regarding MOI is required to anticipate seriousness of injury.
- Continual assessment of abdomen & cardiovascular system to anticipate internal hemorrhage & shock.
- Anticipate nausea & vomiting; have suction prepared.

Management of Blunt Chest Injuries

Consider need for spinal motion restriction.

Assessment

- Rapid Assessment - expose & examine injuries. Visualize for bruising.
  - Palpate for subcutaneous emphysema & crepitus.
  - Inspect for paradoxical movement or an obvious flail segment. Stabilize flail segment.
  - Auscultate chest for decreased or absent breath sounds.
- Consider the position patient based on ease of breathing, if injury permits.
- Position hypotensive patients or patients under spinal precautions supine.
- Continual chest auscultation in anticipation of a tension pneumothorax.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Tranexamic Acid (TXA) Protocol (if indicated).

Events Leading up for Blunt Chest Injuries

Note the following:

- Force / mechanism involved i.e.: what hit the patient, including size, weight and velocity.
- Note degree of forces involved (from height, object thrown)
- Location of patient at impact
- Note any loss of consciousness
- Obtain chief complaint
- Obtain patient's description of incident
- Note initial position and condition of patient
- Note the extent of injury
- Note presence of other injuries
- Note if patient is short of breath
- Note if patient has coughed up any blood

The following is the specific treatments of:

- Flail Segment
- Rib Fracture

Flail Segment

- Patient to self splint & place in position of comfort.
- If required to assist or ventilate the patient, be alert for changes in compliance.
- Continual assessment of respiratory function via rate, effort, saturation, pain or SOB complaint.
- Ensure to ventilate only to visible chest rise, positive pressure ventilation may lead to a tension pneumothorax.

Rib Fracture

- Gently splint the chest wall by having the patient hold a pillow or blanket against the area.

Burn

Management — All Burn Injuries

Assessment

- Rapid Assessment - expose & examine injuries - visualize, palpate & auscultate where appropriate.
- Intervene at each injury site as per Intervention List.
- Initiate Cooling.
- Calculate Body Surface Area (BSA) percentage of burns based on Rapid Assessment.

If priority, transport immediately. Focused history and physical examination, treatments, and protocols to be done en route.

- Consider the overall patient presentation, time to destination, and specific injuries that benefit from Burn Center Care.
- Keep the patient warm as they may have lost their primary mechanism for thermal regulation.
- Consider an assessment of the patient's temperature after cooling to be aware of hypothermia. Assess body temperature after cooling.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Pain Management Protocol (if indicated).

Events leading up for All Burn Injuries

Note the following:

- Note the BSA and the degree of the burn.
- Note the location of the burn
- Obtain an OPQRST
- Note the time of the burn.
- Note the flushing or cooling (time and method).
- Note any underlying injuries.
- Note the length of exposure.
- Consider possibility of inhalation poisoning (carbon monoxide or other).

Specifics per type of burn:

Events leading up for a Airway Burn

- Note time of exposure.
- Note extent of exposure.
- Note if any soot on face, singed hairs on face or in nose.
- Note lung sounds in all fields.
- Note any abnormal breathing sounds or complaints of itchy or swollen throat.

Events leading up for a Chemical Burn

- Note the cause of the burn (type of chemical, concentration of chemical, length of exposure).

Events leading up for an Electrical Burn

- Note the type of current (AC or DC).
- Note the amount of current (high voltage, low voltage).
- Note the entrance and exit wounds.

Events leading up for a Thermal Burn

- Note the cause of the burn (e.g. flame, contact with heater, etc.).

The following is the specific treatment of:

- Airway Burn
- Chemical Burn
- Electrical Burn
- Thermal Burn

Refer to the *PCP Skills Checklists* for Burn Management.

** The focus of initial cooling should be on stopping the burn progression.

Burn dressing application:

- Pain management protocol should be considered prior to bandages if possible.
- Cover wound with dry, sterile, non-stick dressing (telfa or polyguaze).
- Add bandages as needed to secure.

Airway Burn

- Oxygen via high concentration mask
- Position for ease of breathing
- Assisted ventilations via BVM (if indicated)
- Transport Priority
- Consider calling for additional resources for higher level of intervention (CCP, air transport, ACP)
- Cool any thermal burns on face

Chemical Burn

- Flush chemical burns for 20 minutes (ensure any visible chemical is safely removed prior to cooling).
- If necessary continue flushing/cooling measures en route.
- Consider side effects of exposure to specific chemicals and anticipate any complications
- After flushing is complete, dress burns.

Electrical Burn

- Cool major thermal burns for a total of 20 minutes.
- Inspect for entrance and exit wounds
- Use burn pack to create a sterile field for stretcher.
- Consider side effects of exposure to specific voltage and anticipate any complications.
- After cooling is complete, dress burns.

Thermal Burn

- Cool major thermal burns for a total of 20 minutes.
- Use burn pack to create a sterile field for stretcher.
- Consider if exposure has created airway compromise.
- After cooling is complete, dress burns.

Extremities

Management of ALL Extremity Injuries

Assessment

- Rapid Assessment - expose & examine injuries.
  - Inspect joint above & joint below of injury site. Compare injured side with uninjured side.
  - To assess for pelvic instability, apply light pressure to the iliac crests.
  - Palpate above & below injury, identify regions of point tenderness. Palpate for crepitus & instability.
  - Palpate distal circulation on all extremities, with special attention to comparing injured and non- injured limbs.
  - Maintain stabilization of fracture once identified.
- Intervene at each injury site as per Intervention List.
- Consider the position for comfort.
- Position hypotensive patients or patients under spinal precautions supine.
- Apply cold, if appropriate.
- Rapid Trauma Assessment

Consider need for spinal motion restriction.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Pain Management Protocol (if indicated).
- Tranexamic Acid (TXA) Protocol (if indicated).

Events leading up for all Extremity Injuries

Note the following:

- Note the type of fracture (open or closed).
- Note the location of the fracture (proximal end, distal end, mid-shaft).
- Note the limb affected.
- Note the extent of the injury.
- Note the status of distal circulation, sensation and function.
- Note the cause of injury (e.g. direct force, twisting force, fall, etc.).
- Note the patient's description of the incident.
- Note the presence of other injuries.

The following are Specific Treatments of:

- Compartment syndrome
- Joint Injuries
- Limb Amputation
- Pelvic Injury
- Shoulder Girdle Injury
- Upper & Lower Limb Injury

Compartment Syndrome

- Be aware of the possibility that compartment syndrome may develop with any major trauma to the extremities (severe contusions, fractures), especially in the calf area. As motor and sensory functions usually remain normal and distal pulses are often present, severe pain that appears out of proportion to the physical findings is considered the most prominent symptom.
- Treatment for compartment syndrome consists of treating the underlying injury:
- Splint and immobilize all suspected fractures
- Apply appropriate traction where indicated
- Apply cold packs to severe contusions

Joint Injuries

Repeat Pulse, Motor, & Sensory (PMS) assessments should be conducted with any major move of patient. Prior to manipulating a joint injury, all three criteria below must be present:

1. Marked angulation at the joint.
2. Distal limb is pale, cool, & pulseless.
3. Treatment & transport time is greater than 30 minutes from hospital.

Ankle

- Immobilize with either a pillow or plantar splint.
- Do not place any side braces across injured side of ankle.
- Utilize trauma straps or triangular bandages to secure padding/splint to lower limb

Elbow & Wrist

- If manipulation is required, apply gentle traction & increase flexion to 90 degrees. Do not manipulate if elbow is found in an angle < 90 degrees.
- Cease manipulation if: the radial pulse returns, you reach 90 degrees of flexion, or there is resistance or marked increase in pain.
- Apply a rigid splint that extends from the axilla to the end of the fingertips.
- Splinted arm can be stabilized with a sling for additional support.

Hip

- If you suspect a hip dislocation, due to MOI & gross deformity, consider the patient with a significant MOI & transport after the initial assessment.
- Pad to support the limb in the position of comfort.
- Secure injured limb to uninjured limb with trauma straps and blankets.
- Minimum straps to be placed: 2 across proximal lower limb & 1 across distal lower limb.

Knee

- Contact Medical Direction prior to reducing a dislocated knee.
- Pad to support the limb in the position of comfort.
- Secure injured limb to uninjured limb with trauma straps and blankets.
- Minimum straps to be placed: 1 above & 1 below knee.

Limb Amputation

Refer to the PCP Skills Checklists for fracture management.

Managing the amputated limb:

- Follow hemorrhage control with direct pressure & hemorrhage control with tourniquet guidelines.
- Consider splinting limb if you suspect an associated fracture.

Preservation of amputated part:

- Rinse the amputated part free of debris with cool, sterile saline.
- Wrap the part loosely in moist, sterile gauze.
- Seal the amputated part in a plastic bag or cool container.
- Transport the part with the patient.
- Consider notifying the receiving hospital with the condition of the patient and part.'

Pelvic Injury

Refer to the PCP Skills Checklists for fracture management.

- Stabilization should include the use of the clamshell.
- Support the pelvis by applying pelvic binder.

Shoulder Girdle Injury

Refer to the PCP Skills Checklists for fracture management.

Repeat Pulse, Motor, & Sensory (PMS) assessments should be conducted with any major move of patient.

Clavicle

- Consider self-stabilization by patient.
- Utilize sling & transverse bandage to assist in immobilization.

Scapula

- Scapula injuries usually require significant MOI – consider underlying chest & spinal injuries.
- Consider self-stabilization by patient.

Upper & Lower Limb Injury

Refer to the PCP Skills Checklists for fracture management.

Repeat Pulse, Motor, & Sensory (PMS) assessments should be conducted with any major move of patient.

Splinting is intended to immobilize the injury, decrease the pain, and reduce the risk of further damage to muscles, nerves, blood vessels, and skin. Utilize PCP Skills Checklists for principles of splinting.

Femur

- If grossly angulated, realign to anatomical position.
- Closed mid-shaft fracture: apply 10% of body weight to a max of 15 lbs of traction.
- Compound mid-shaft fracture: apply 5 lbs of traction.
- Stabilize fractures with straps & blankets.

Humerus

- If grossly angulated, realign to anatomical position.
- Apply a rigid splint that extends from the axilla to the end of the fingertips.
- Splinted arm can be stabilized with a sling for additional support.

Impaled Limb

- Control hemorrhage.
- Immobilize all impaled objects in place with bulky dressings.
- Check for exit wounds.
- Ensure all movements are done as smooth as possible
- If the impaled object is too large to transport or is affixed to something that can't be removed, consider cutting and/or removing object with help with specialized emergency services.

Radius/Ulna

- If grossly angulated, realign to anatomical position.
- Apply a rigid splint that extends from the axilla to the end of the fingertips.
- Ensure hand is placed in position of function when splinting.
- Splinted arm can be stabilized with a sling for additional support.

Tibia/Fibula

- If grossly angulated, realign to anatomical position.
- Double thickness rigid splint on medial and lateral side of injury support above & below the fracture.
- Secure the injured limb to the uninjured limb with trauma straps or triangular bandages.
- Place the patient on the clamshell.

Penetrating

The following events fall under the Penetrating title.

- Management of Penetrating Abdomen injuries
- Management of Penetrating Chest injuries

Consider need for spinal motion restriction.

Management of Penetrating Abdomen Injuries

Consider need for spinal motion restriction.

Assessment

- Rapid Assessment - expose & examine injuries.
  - Stabilize any impaled objects in the position found.
  - Inspect for entry & exit wounds.
  - Visualize and palpate all 4 quadrants.
- Consider the position patient based on comfort; patient may want knees raised.
- Position hypotensive patients or patients under spinal precautions supine.
- Rapid Trauma Assessment.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Pain Management Protocol (if indicated).
- Tranexamic Acid (TXA) Protocol (if indicated).

Events leading up for a Shooting

Note the following:

- Type and caliber of firearm.
- Range, angle and number of shots.
- Type of bullet, if possible.
- Any entrance and exit wounds.
- Number of wounds.
- Initial position and condition of patient.
- Any loss of consciousness.
- Was the patient wearing body armour.

Events leading up for a Stabbing

Note the following:

- Type of weapon or object.
- Size, length, and width of weapon.
- Angle and number of wounds.
- Other injuries.
- Initial position and condition of patient.
- Was the patient wearing body armour.

The following is the specific treatments of:

- Evisceration
- Impaled Abdomen

Refer to the PCP Skills Checklists for treating a penetrating wound.

- Critical history regarding MOI is required to anticipate seriousness of injury.
- Anticipate any movement of patient to aggravate injury & disrupt stabilizing bandages.
- Continual assessment of abdomen & cardiovascular system to anticipate internal hemorrhage & shock.

Evisceration

- Directly cover organs with moist, sterile gauze.
- Add abdominal dressings or additional soaker pads.
- Corral the contents with bulky dressing.
- It may be necessary to utilize loose, encircling triangular bandages.
- Consider prevention of heat loss by adding a plastic cover to the dressing.

Impaled Abdomen

- Control hemorrhage.
- Immobilize all impaled objects in place with bulky dressings.
- Check for exit wounds.
- Ensure all movements are done as smooth as possible.
- If the impaled object is too large to transport or is affixed to something that can't be removed, consider cutting and/or removing object with help with specialized emergency services.

Management of Penetrating Chest Injuries

Consider need for spinal motion restriction.

Assessment

- Rapid Assessment - expose & examine injuries.
  - Visualize, palpate & auscultate the chest. Inspect for entry & exit wounds.
  - Cover sucking chest wounds.
- Consider the position patient based on ease of breathing, if injury permits.
- Position hypotensive patients or patients under spinal precautions supine.

Protocol(s)

- Fluid Resuscitation Protocol (if indicated).
- Tranexamic Acid (TXA) Protocol (if indicated).

Events leading up for a Shooting

Note the following:

- Type and caliber of firearm.
- Range, angle and number of shots.
- Type of bullet, if possible.
- Any entrance and exit wounds.
- Number of wounds.
- Initial position and condition of patient.
- Any loss of consciousness.
- Was the patient wearing body armour.

Events leading up for a Stabbing

Note the following:

- Type of weapon or object.
- Size, length, and width of weapon.
- Angle and number of wounds.
- Other injuries.
- Initial position and condition of patient.
- Any loss of consciousness.
- Was the patient wearing body armour.

The following is the specific treatment of:

- Impaled Chest
- Open Sucking Chest

Refer to the PCP Skills Checklists for treating a penetrating wound.

- Look for: deformity, skin color changes, muscle spasms, inappropriate range of motion, & major blood loss (internal or external).
- Anticipate progression of internal or external hemorrhage & signs of shock.
- If required to assist or ventilate the patient, be alert for changes in compliance. Assist inadequate respirations only if necessary. Ensure to ventilate only to visible chest rise, positive pressure ventilation may lead to a tension pneumothorax.
- Continual chest auscultation in anticipation of developing a tension pneumothorax.

Impaled Chest

- Control hemorrhage.
- Immobilize all impaled objects in place with bulky dressings.
- Check for exit wounds.
- Ensure all movements are done as smooth as possible
- If the impaled object is too large to transport or is affixed to something that can't be removed, consider cutting and/or removing object with help with specialized emergency services.

Open Sucking Chest

- Cover the wound with an occlusive dressing. Tape on three sides or utilize a commercially available chest seal.
- Monitor occlusion dressing for a complete seal when there is presence of blood or diaphoresis.
- Be prepared to release the seal to prevent a buildup of pressure that can lead to a tension pneumothorax.
- Continual assessment of both respiratory and cardiovascular systems in anticipation of shock.

Head, Face & Neck

The following events fall under the Head, Face & Neck title:

- Management of ALL Head, Face & Neck injuries
- Management of Potential Spinal Column/Cord injury

Management of ALL Head, Face & Neck injuries

Assessment

- Consider need for spinal motion restriction.
- Inspect the airway and breathing status, intervene as necessary.
- Be prepared for patient changes (i.e. vomiting, ineffective respirations, abnormal posturing, seizures, cardiac arrest).
- Rapid Assessment – expose & examine injuries
  - Hemorrhage --Apply direct pressure to any external hemorrhage; observe for signs of internal hemorrhage.
  - Intervene at each injury site as per the Intervention List.
  - Visual acuity (checking for vision loss, double vision, severe eye pain).
- Position hypotensive patients or suspected C-spine patients supine.
- Consider Oxygen administration.

Protocols

- Fluid Resuscitation Protocol (if indicated).
- Intracranial Pressure (ICP) Protocol (if indicated)
- Pain Management Protocol (if indicated).
- Tranexamic Acid (TXA) Protocol (if indicated).

Events leading up for all Head, Face & Neck Injuries

Note the following:

- Force/mechanism involved (Size and length of object; gauge of firearm used, etc.)
- Degree of forces involved (fall from height, object thrown) description.
- Cause of the injury (blunt trauma, fall from height, assault, projectile, etc.)
- Chief Complaint
- Patient's description of the incident
- Type of injury (open or closed, impaled or extruded etc.)
- Extent of the injury
- Presence of other injuries
- Obtain OPQRST

The following is specific treatments of:

- Head Injuries
- Eye Injuries
- Neck Injuries

Head Injuries

Patients with a suspected isolated Traumatic Brain Injury (TBI) should be positioned on the cot with the head raised 30 degrees and consider loosening of the c-collar to avoid ICP.

Closed Head injury

- Cervical spine management as required.
- Airway management (i.e. Manual maneuver- jaw-thrust, suction as required, airway adjuncts).
- Be prepared for patient changes (i.e. vomiting, ineffective respirations, abnormal posturing, seizures, cardiac arrest).
- Apply High flow oxygen.
- Priority transport to higher level of care.

Open Head injury

- Follow closed head injury principles of management.
- Control external hemorrhage with direct pressure – take caution not to apply any pressure to open skull fractures.

Penetrating Head injury

- Follow closed head injury principles of management.
- Control external hemorrhage.
- Look for entrance and exit wounds.
- Apply sterile non-stick and bulky dressings, secure with triangular bandage, roller gauze or tape – take caution not to apply any pressure to open skull fractures.

Impaled Head injury

- Follow open head injury principles of management.
- Manually support impaled object in place.
- Do not remove impaled object. (Only exception to this is where the impaled object presents an immediate threat to the airway or breathing that prevents management).
- Apply padding around the impaled object to stabilize in place, noting location of injury and underlying structures.
- Secure padding (triangular, roller gauze or tape) to minimize movement of object – take caution not to apply any pressure to open skull fractures.

Eye Injuries

For all types of eye injuries:

- Consider spinal motion restrictions.
- Cover the non-injured eye to prevent sympathetic eye movement.
- Position patient supine.

Extruded Eyeball Injury

- Do not relocate extruded eye or tissue.
- Control external hemorrhage by applying manual direct pressure with a bulky dressing as required.
- Support extruded eye & surrounding tissue with sterile dressings.
- Cover eyeball with moist sterile dressing.
- Apply dry bulky dressings to support eyeball.
- Use a sturdy eye cup (other options: ring pad or clean firm coffee cup) to keep pressure off of eyeball.
- Secure cup and padding (triangular or tape) to minimize movement of injury.

Penetrating Eye injury

- Control external hemorrhage by applying manual direct pressure with a bulky dressing, take caution not to compress eyeball or orbital bones.

Impaled Eye Injury

- Manually support impaled object in place.
- Do not remove penetrating object. (Only exception to this is where the penetrating object presents an immediate threat to the airway or breathing that prevents management).
- Apply padding around the impaled object to stabilize in place, noting location of injury and underlying structures.
- Secure padding (triangular or tape) to minimize movement of object – take caution not to apply any pressure to open skull fractures.

Neck Injuries

The following is specific treatments of:

- Anterior Neck Laceration
- Impaled Neck injury

Anterior Neck Laceration

- Cervical spine management as required.
- Control external hemorrhage by applying manual direct pressure with a bulky dressing, take caution not to compress airway.
- Cover open neck wound with an occlusive dressing.
- Do not compress both carotid arteries simultaneously.
- Apply High flow oxygen via non-rebreathing concentration mask.
- Priority transport to higher level of care.

Impaled Neck injury

- Cervical spine management as required.
- Pay special attention to airway assessment and management.
- Control external hemorrhage by applying manual direct pressure with a bulky dressing, take caution not to compress airway.
- Cover open neck wound with an occlusive dressing.
- Do not compress both carotid arteries simultaneously.
- Manually support impaled object in place.
- Do not remove penetrating object. (Only exception to this is where the penetrating object presents an immediate threat to the airway or breathing that prevents management).
- Apply padding around the impaled object to secure in place, noting location of injury and underlying structures.
- Secure padding to minimize movement of penetrating object.
- Consider priority transport to higher level of care.
- Apply High flow oxygen via non-rebreathing concentration mask.

Management of Potential Spinal Column/Cord injury

Assessment

- Rapid Assessment – expose & examine injuries, visualize & palpate where appropriate.

Note: spinal deficit alone does not make a patient a priority patient. Consider MOI & initial assessment

The following is the specific treatments of:

- Potential Spinal Column / Cord Injury.

Potential Spinal Column / Cord Injury.

Refer to Spinal Management Checklist for Spinal Management.

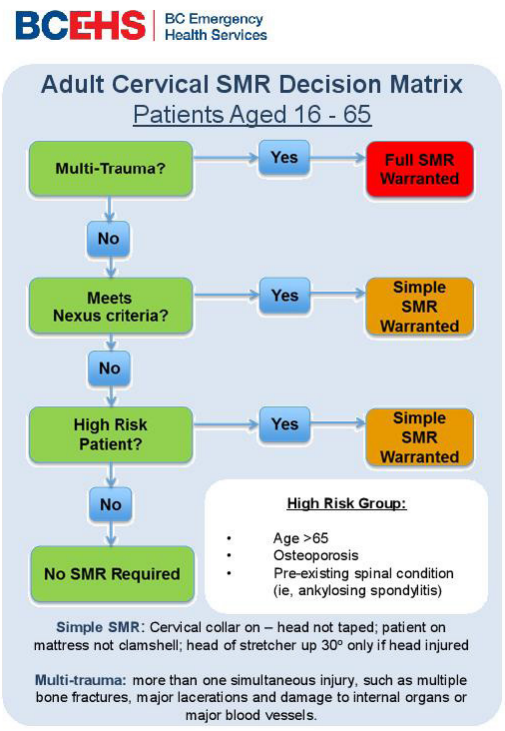
- Repeated pulse, motor & sensory (PMS) assessments should be conducted.

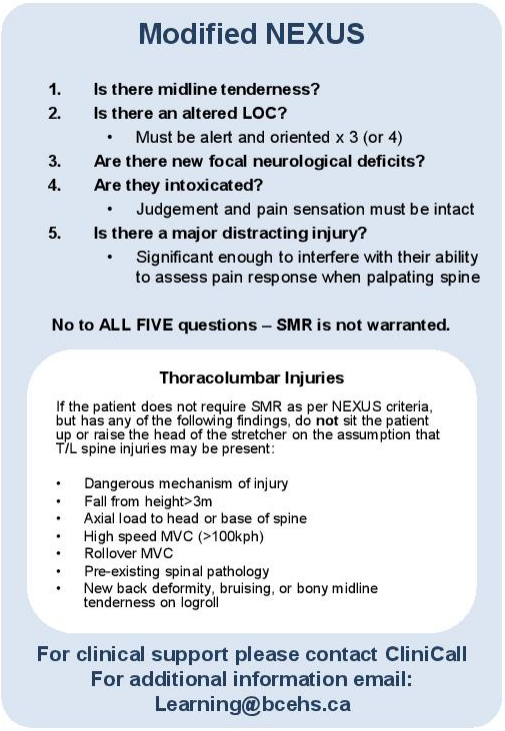
Restriction includes:

- Align head & neck into neutral position.
- Apply a properly sized hard collar.
- Place the patient on a restriction device.
- Apply head support and apply stretcher straps on the main cot.
- Spider Straps & taping of the head is required when the patient if carried at an angle or for an extended distance (due to extrication or environmental circumstances)

Modified Nexus Criteria

The Modified Nexus Criteria is a tool to aid your assessment process, it does not replace through assessment of the patient





Justice Institute
BRITISH COLUMBIA

Training Protocols

Training Protocols

Introduction to the Training Protocols

This section contains the Training Protocols that you will use for this program.

Protocols are medical procedures that are normally in the domain of a physician. However, under certain conditions, paramedics may perform specific delegated medical acts. In order to perform these functions, paramedics must follow written protocols or standing orders. Each of the following protocols define what actions a PCP Paramedic is allowed to perform, under what conditions they can be performed and under what conditions they should not be performed.

These protocols are based on the standards set by the National Occupational Competency Profile for Primary Care Paramedics. Use these training protocols to guide your study and your practice in the program. When you find disagreement between various content resources, follow your Training Protocols and Principles of Management. All of your written and practical evaluations will be based on the PCP Training Protocols and Principles of Management.

Note that these are training protocols only. When you are working in the field, either as a student in a field practicum or as a licensed paramedic, you must follow the operational protocols of the service you are working for.

Expectations regarding the phrase "Continue with treatment and assessment"

This phrase is used often in both the wording of the written protocols and as an evaluation component. The interpretation of this is sometimes misleading.

What does this mean?

During the care of a patient, there will always be a discovery of an injury or condition that may require specific action to be taken. This action may be as elementary as positioning (such as a jaw thrust, limb alignment or lying a patient down). In a protocol situation, this may mean administering a drug or IV fluid. Once that action has been performed, it is prudent that the effects of that action or intervention are re-assessed. This is why the baseline vital signs are a mandatory step in the assessment of all patients. Without a baseline, there would be no definitive markers to compare to. Simply put, the care giver must be able to determine that an intervention has improved, worsened or made no change to a patient's condition. This re-assessment will dictate the need for continuing, maintaining, stopping or changing the action provided.

How does this affect the call flow?

The patient assessment is designed to work through a call on a priority based approach. There is no benefit to the patient, if an intervention action is taken, but is not assessed for effectiveness. Once a necessary action has been implemented, the call flow resumes in order to complete all aspects of the patient assessment and management. There are circumstances where an immediate resolve is crucial to assess for; as in the case of an airway obstruction or significant bleeding. Other times the results of your intervention may not be evident for several minutes such as in the case of a fluid bolus for hypovolemia or the administration of intramuscular naloxone in a narcotic OD. In these latter examples, the history taking and physical exam components can be continued until the response to treatment is appropriate to be assessed.

How does this affect the interval of vital sign assessment?

During the assessment and management of a patient, it is determined that in a Non-Priority condition, vital signs are assessed every 15 minutes and the Priority category of patients will have vitals assessed every 5 minutes. This interval based assessment serves 2 purposes; 1) reveals a trend in the vital sign values to enable the caregiver to predict probable progression and; 2) shows the effects and/or clinical markers in response to a specific drug or therapeutic action. With this in mind, it is reasonable to extend the interval of vital sign assessment if a therapeutic action is being administered. Examples of this are;

D10W is being administered IV to an unresponsive hypoglycemic diabetic. 100 mls has had no effect on the patient's mental status and you are now in the process of moving the patient to your ambulance while a 2nd 100 ml bolus is being administered. It is at the 5 minute interval for vital sign assessment. It is reasonable and acceptable to complete the move, load the patient and re-assess the ABC's before taking the vital signs. This may result in the vital signs being 8 or 9 minutes apart but will not cause patient harm.

Remember that the objective is to assess for the effect of treatment or to establish a trend of the patient's condition. There is little value to pause your action, in order to assess vital signs while performing a treatment or loading a patient. It is also reasonable, if in the process of delivering a protocol-based drug or fluid, to delay vital sign assessment. This will enable the care giver to fully assess the effects of the therapy given. In the Priority patient, this delay should not extend past a 10 minute interval in order to capture the trending of vital signs, regardless of treatments rendered. In the Non-Priority patient sub-section, it is also reasonable to delay the vital signs to complete an ongoing procedure (such as splinting) providing that vital signs are assessed promptly after completing the treatment.

Airway Foreign Body Protocol

INDICATIONS

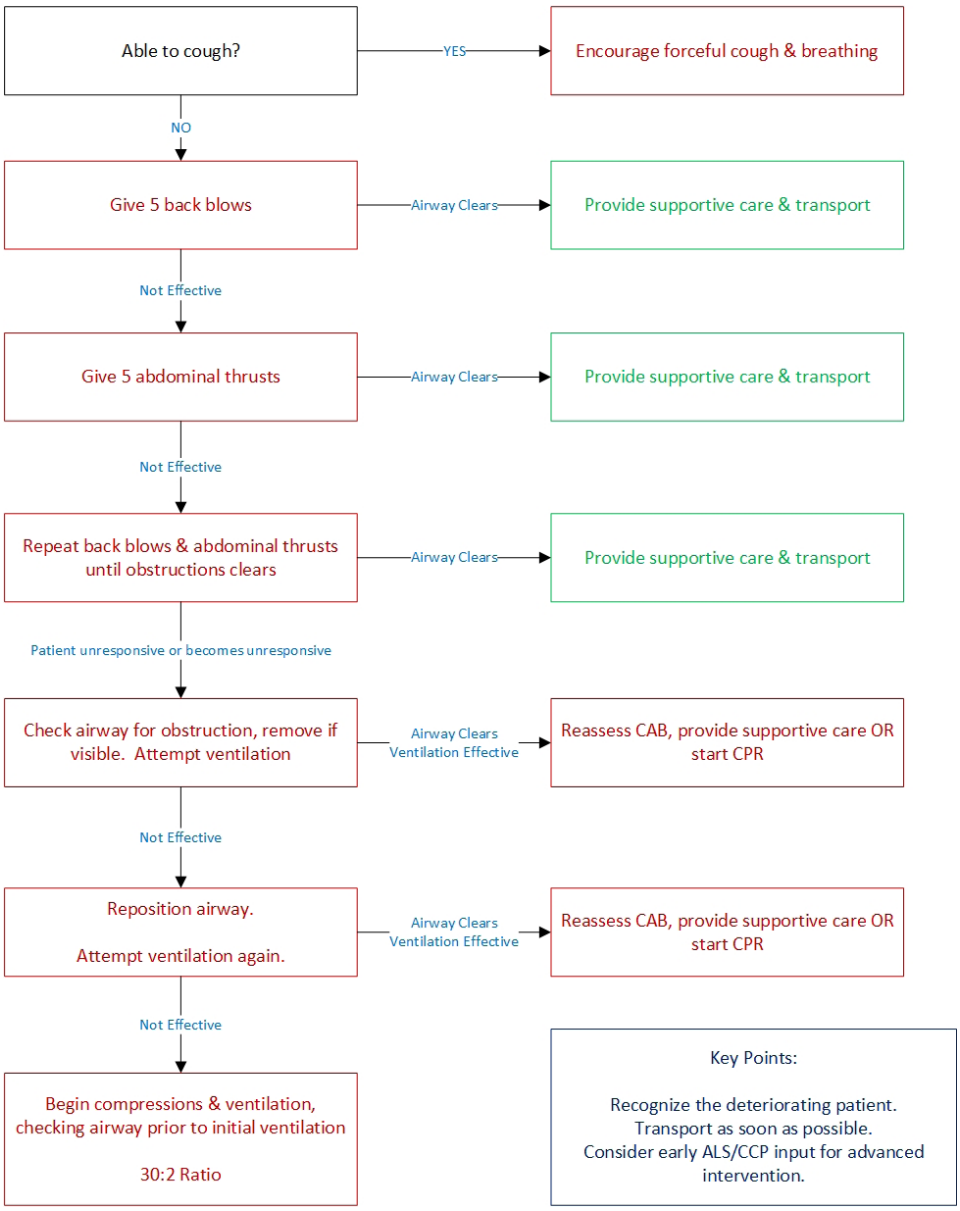
- Weak and ineffective cough, cyanosis, inability to speak, difficulty or inability to breath, stridor, or body position, suggestive of choking (i.e. grasping at neck, tripoding forward).

CONTRAINDICATIONS

- none

Before initiating the airway foreign body protocol, you must:

- Complete a scene assessment



Altered Mental Status Guidelines

Definition

Altered mental status is a continuum ranging from mild confusion to deep unconsciousness with absent responses.

There are several causes of a decreased mental status that may be included in the following mnemonic:

A – Acidosis, alcohol

E – Epilepsy

I – Infection

O – Overdose

U – Uremia (kidney failure)

T – Trauma, tumor, toxins

I – Insulin (hypoglycemia, diabetic ketoacidosis)

P – Psychosis, poison

S – Stroke, seizure

Goal of Care

Consider any patient with a decreased mental status as Priority and initiate transport as soon as possible, however, it may be beneficial to remain on scene and treat a reversible cause.

Guiding Principles

It is logical to use the mental status as the benchmark for improvement, however, improvement may also manifest as an increasing ability to maintain an airway or a generalized improvement in vital signs. Factors such as age, body mass and underlying medical conditions will all contribute to both the time scale over which effects are noticed and the degree of change brought about.

If the patient does not improve or deteriorates after treatment:

- Maintain the patient's ABC's (consider the use of an extraglottic device)
- Contact Medical Direction for further orders
- Consider other causes of unconsciousness using AEIOUTIPS

Other Considerations

Consider insertion of an extraglottic device for patients with prolonged respiratory compromise, whose respirations do not improve with treatment.

- Consideration must be given to level of difficulty ventilating the patient, GCS, distance to hospital and achievable oxygen saturation.
- Care must be taken when ventilating the patient (with or without an extraglottic device) to ventilate only enough for chest rise.
- Oxygen saturation goal should be 95% or more.
- If correcting for hypoglycemia, a blood glucose must be checked after EACH bolus.
- If using an IV start that does not have an attached lock, be aware that starting a line of Normal Saline and piggy-backing D10W may be better for overall safety.

Anaphylaxis Protocol

Go to P.O.M.
- Environmental
- Neurological

INDICATIONS

Patients with suspected anaphylaxis including all of the following:

- Signs of anaphylaxis
- Exposure to an allergen

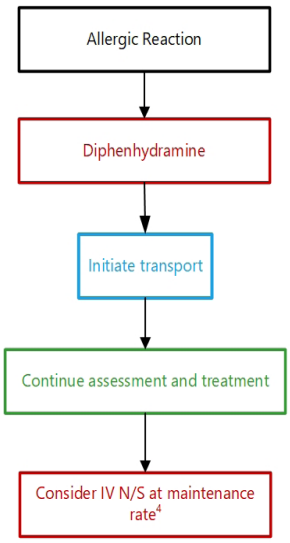
CONTRAINDICATIONS

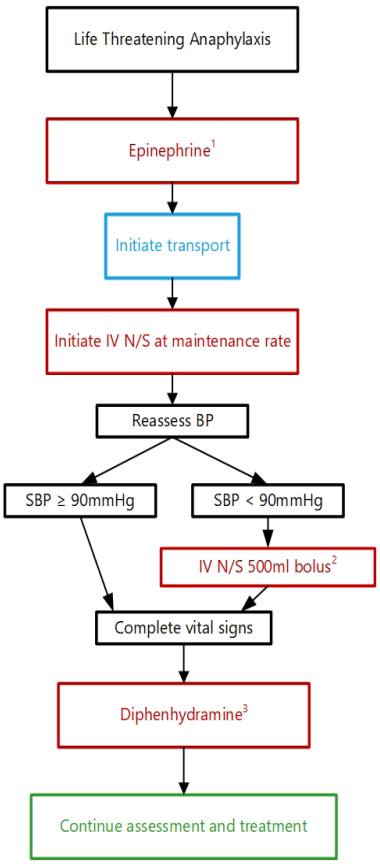
Refer to *BCEHS Handbook* for drug monographs for:

- Diphenhydramine (Benadryl)
- Epinephrine Hydrochloride (Epi)
- Normal Saline (N/S)

Before initiating the Anaphylaxis protocol, you must:

- Complete an initial assessment and administer oxygen
- Obtain signs and symptoms of an allergic reaction or anaphylaxis
- Obtain critical history including medical history, medications, and allergies
- Rule out any medication contraindications
- Obtain a baseline set of vital signs including oxygen saturation
- Priority: decreased mental status, or hypotension (BP < 90 mm Hg), or respiratory distress.





1. Epinephrine can be administered every 5 minutes PRN.
2. Before and after the 500 mL N/S bolus, auscultate the lung bases. If signs and symptoms of pulmonary edema are present, administer N/S at maintenance rate. Contact Medical Direction if patient condition suggests a need for additional fluid bolus.
3. IV Diphenhydramine is the preferred route of administration. In cases where IV access is not possible, IM administration is the next preferred method. If IM administration is not possible, consider PO administration in the conscious patient who has the ability to swallow.
4. Be aware of the potential for patient deterioration when considering IV access.

Anaphylaxis Protocol Guidelines

Definition

Allergic Reaction – may range in severity from mild, with only a rash, to life threatening. The degree of the severity depends on the body's response to the allergen.

Signs of anaphylaxis include urticaria, and/or angioneurotic edema, and/or hypotension/shock. Allergic reactions may range in severity from mild, with only a rash, to life threatening.

Early Anaphylaxis – Minor Symptoms

Most, but not all patients with anaphylaxis develop a rash. A patient with urticaria that has been present for greater than 30 minutes, not associated with breathing or swallowing problems, may not require Epinephrine treatment in the pre-hospital setting.

Anaphylaxis – Life Threatening

Priority anaphylaxis patients may have: Decreased mental status or Hypotension or Respiratory distress. You do not require all three of these conditions to treat the patient as Priority.

Goal of Care

The goal of treatment is to reverse signs of anaphylaxis and prevent further progression.

It is important to recognize the severity of life threatening anaphylaxis and treat early with Epinephrine, Fluid resuscitation and Diphenhydramine.

Guiding Principles

Epinephrine causes tachycardia and vasoconstriction, both of which can cause an increase to BP. After initial Epinephrine administration, reassess BP prior to fluid bolus in the anaphylactic patient that was previously hypotensive. Epinephrine is most effective when administered into mid-outer thigh (vastus lateralis muscle).

Other Considerations

Shortness of Breath and Asthma - Use the Shortness of Breath Protocol for patients with shortness of breath and a history of asthma with allergies to inhaled substances such as pollen or cat dander.

Asthma and a history of an Injected or Ingested Allergen - Use the Anaphylaxis Protocol for asthmatic patients who have a history of a sting or ingested allergen (e.g. peanuts, bees).

Asthma and Profound Collapse - Use the Anaphylaxis Protocol for asthmatic patients with profound collapse, hypotension or edema in the face and/or neck, secondary to an allergen exposure.

Epinephrine Auto-Injectors - If a patient has used their own Epinephrine auto-injector prior to crew arrival, continue to administer epinephrine as per protocol even if within 10 minutes.

Diphenhydramine (Benadryl) - Diphenhydramine serves to reduce effects mediated by histamine released during allergic reactions. Histamine, acting on H1-receptors, produces: sneezing, pruritus, rhinorrhea, vasodilation, hypotension, flushing, headache, tachycardia, bronchoconstriction, and increased vascular permeability.

While Diphenhydramine will help against these effects, it will not reverse effects if taken after contact with the allergen. In severe allergies such as anaphylaxis these effects may be so severe as to be life threatening. Diphenhydramine in the emergency setting should be considered to compliment the administration of epinephrine and used to prevent progression of symptoms.

Full Reassessment of Indication for Protocol

Full Reassessment of Indications **PRIOR** to Additional Doses of Medication – Reassess All below					
Breathing – Rate and effort	Auscultation – Lung sounds	Skin – color, temperature and texture	GCS	Hypotension	

Go to P.O.M.
- Cardiac Arrest

Cardiac Arrest Protocol - MEDICAL

INDICATION

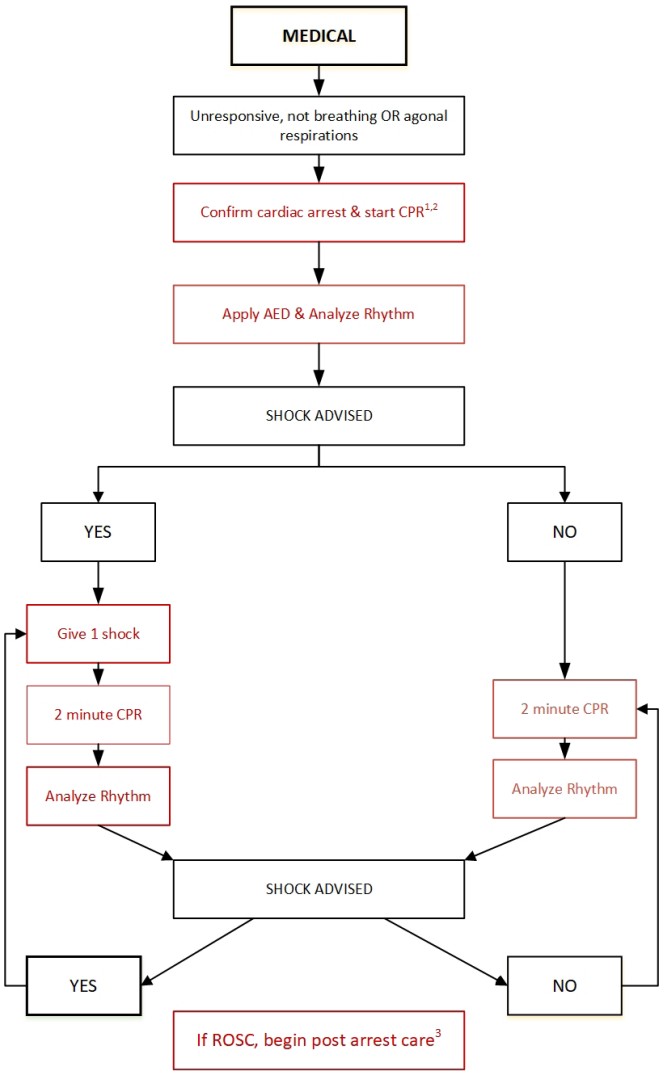
- Patients in cardiac arrest without verified DNR

CONTRAINDICATIONS

- Verify DNR or advanced directive.
- See situations in which resuscitation should not be attempted in Protocol Guidelines

Before initiating the Cardiac Arrest Protocol - Medical, you must:

- CPR is to be initiated within 10 seconds of determining a patient to be pulseless, or in case of pediatrics – signs of inadequate circulation.
- Determine if spinal motion restriction is required.
- If CPR already in progress, paramedics must stop CPR and complete a 'CAB' assessment immediately.
- If no pulse, immediately start chest compressions.



1. Pediatric patients are defined as < 12 years old. Pediatric cardiac arrest is often secondary to hypoxia.
2. Post ROSC care includes: Transport patient supine with continual reassessment of ABC's for any changes and vital signs every 5 minutes including Blood Glucose level. Leave AED attached to patient, with power on.
3. When transporting in cardiac arrest, swap compressors during analyze as to reduce time off the chest. When transporting patient in arrest, stop vehicle to analyze every 4-5 minutes. If shock advised while transporting, stay in place and continue CPR protocol until no shock advised.

Go to P.O.M.
- Cardiac Arrest

Cardiac Arrest Protocol – TRAUMA

INDICATION

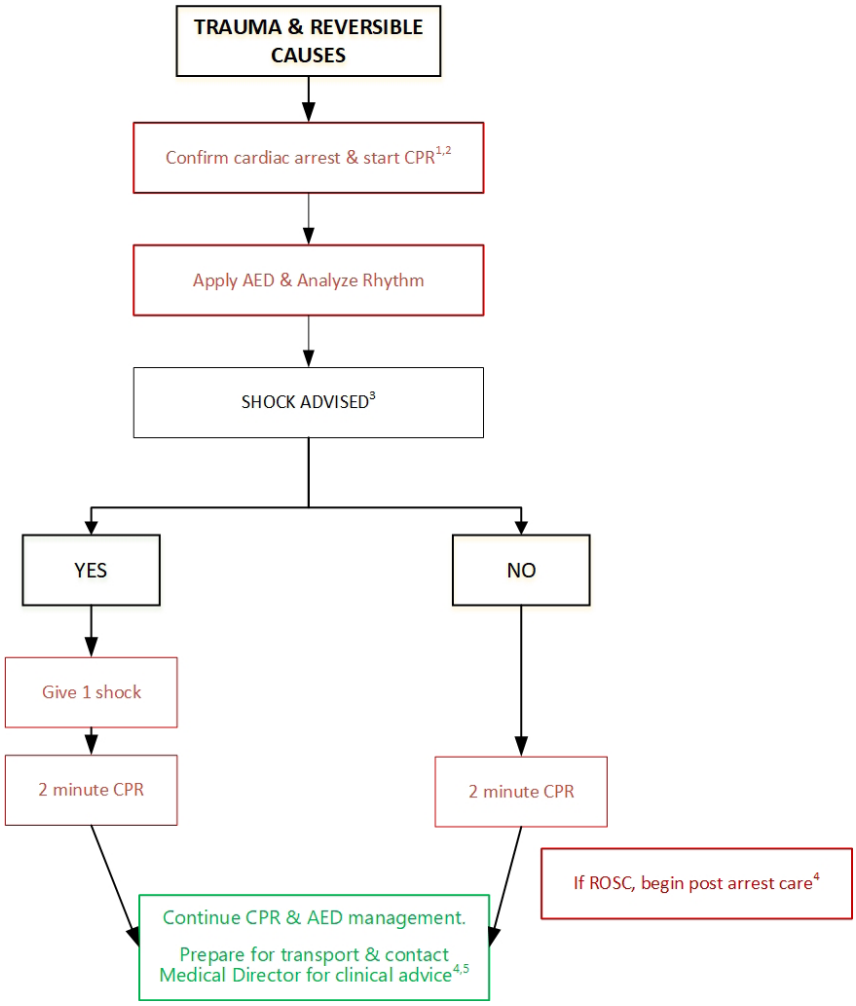
- Patients in traumatic (blunt or penetrating) cardiac arrest without verified DNR

CONTRAINDICATIONS

- Verify DNR or advanced directive.
- See situations in which resuscitation should not be attempted in Protocol Guidelines

Before initiating the Cardiac Arrest Protocol - Trauma, you must:

- CPR is to be initiated within 10 seconds of determining a patient to be pulseless, or in case of pediatrics – signs of inadequate circulation.
- Determine if spinal motion restriction is required.
- If CPR already in progress, paramedics must stop CPR and complete a CAB assessment immediately.
- If no pulse, immediately start chest compressions.



1. Pediatric patients are defined as < 12 years old. Pediatric cardiac arrest is often secondary to hypoxia.
2. Order of action when starting CPR: Start chest compressions, Apply AED, Initiate BVM, Connect Oxygen to BVM, Consider airway adjunct
3. Traumatic arrests in a shockable rhythm should be shocked on scene, prior to further analyzing consider: cause of arrest, circumstances of arrest, age of patient, distance to hospital.
4. Post ROSC care includes: Transport patient supine with continual reassessment of ABC's for any changes and vital signs every 5 minutes including Blood Glucose level. Leave AED attached to patient, with power on.
5. When transporting in cardiac arrest, swap compressors during analyze as to reduce time off the chest. When transporting patient in arrest, stop vehicle to analyze every 4-5 minutes. If shock advised while transporting, stay in place and continue CPR protocol until no shock advised.

Go to P.O.M.
- Cardiac Arrest

Cardiac Arrest Protocol – NEWBORN

INDICATION

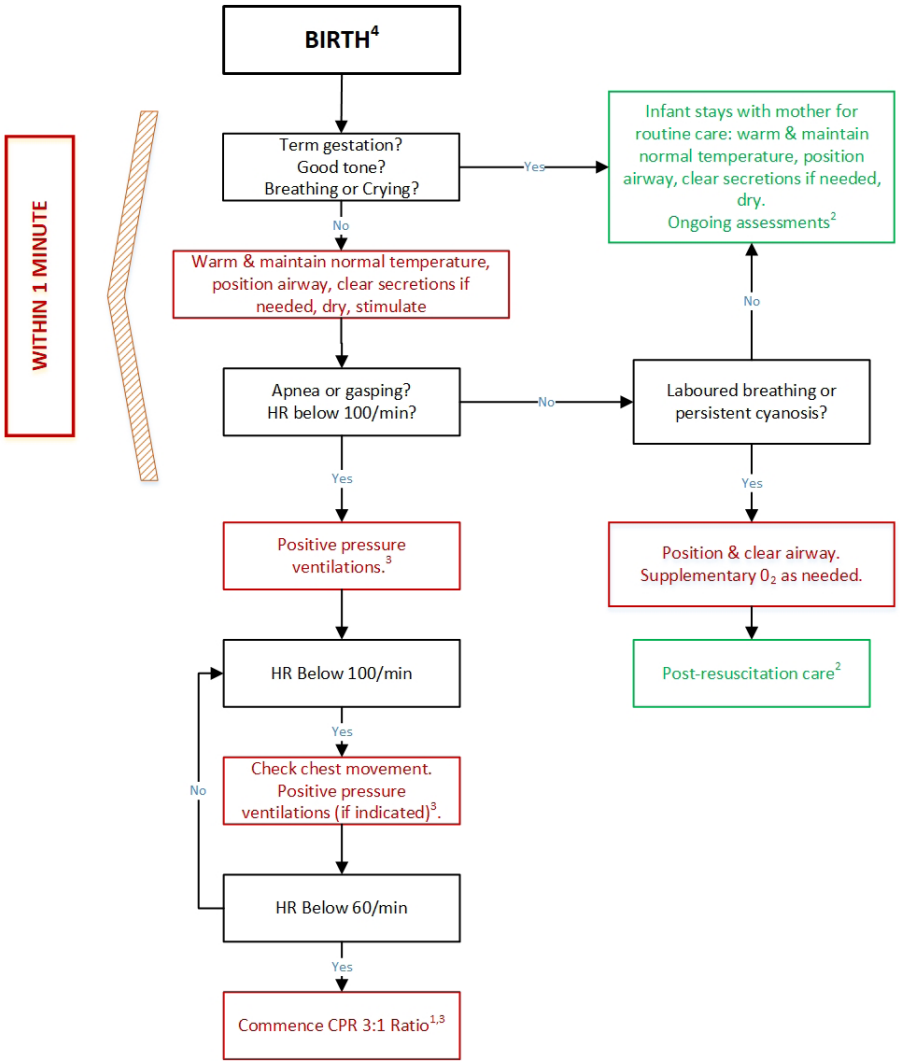
- Newborn baby born in cardiac arrest or requiring post birth resuscitation.

CONTRAINDICATIONS

- Verify DNR or advanced directive.
- See situations in which resuscitation should not be attempted in Protocol Guidelines

Before initiating the Cardiac Arrest Protocol - Newborn, you must:

- Complete scene assessment



1. Do not apply the AED for this age group. Emphasis on airway management, oxygenation and CPR if needed.
2. Post resuscitate care: rechecking all critical interventions, redo APGAR score, providing care to mother & planning for transport. Refer to POM.
3. Apply caution with positive pressure ventilation – pulmonary barotrauma can result from hyperinflation of the thoracic cavity. Risks including alveolar rupture and pneumothorax.
4. At all times, consider: Priority Transport, care of mother, ACP/ITT Resources

Adapted from: Wyckoff, M. Aziz, K. Escobedo, M et al (2015). American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and emergency Cardiovascular Care. Circulation, 132, 543 – 560. (https://www.ahajournals.org/doi/pdf/10.1161/CIR.0000000000000267)

Go to P.O.M.
- Cardiac Arrest

Cardiac Arrest Protocol – PEDIATRIC (28 days until puberty)

INDICATIONS

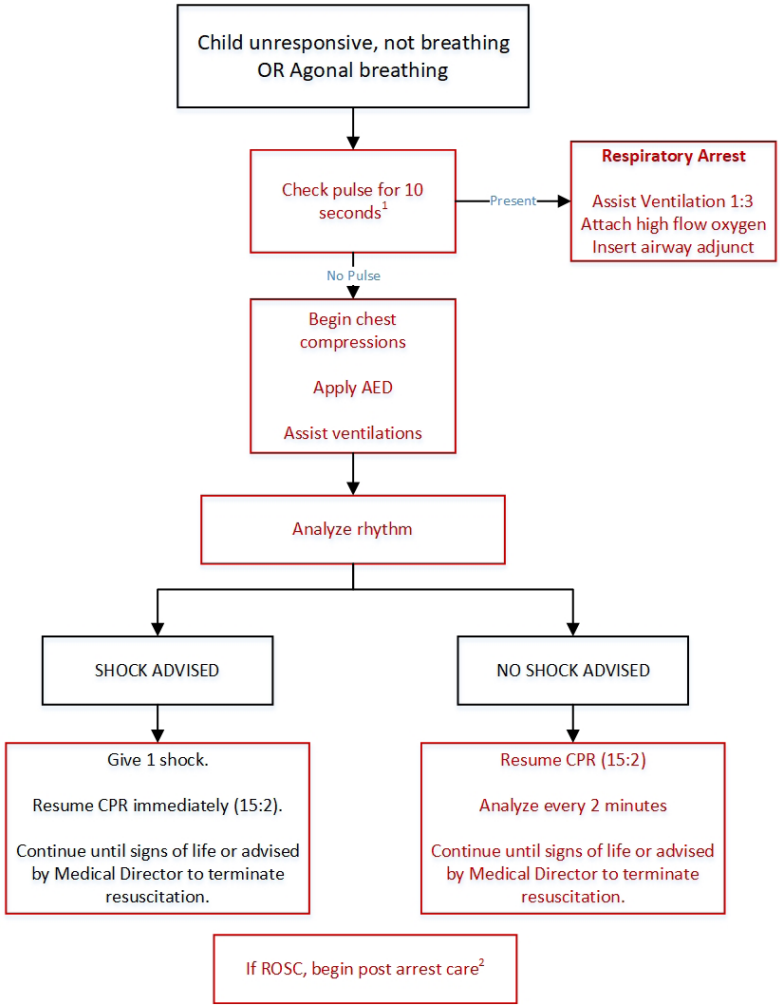
Pediatrics from 28 days old until puberty in cardiac arrest without verified DNR

CONTRAINDICATIONS

- Verify DNR or advanced directive.
- See situations in which resuscitation should not be attempted in Protocol Guidelines

Before initiating the Cardiac Arrest Protocol - Pediatric, you must:

- CPR is to be initiated within 10 seconds of determining a patient to be pulseless, or in case of pediatrics – signs of inadequate circulation.
- Determine if spinal motion restriction is required.
- If CPR already in progress, paramedics must stop CPR and complete an initial assessment immediately.
- If no pulse, immediately start chest compressions.



1. When to start CPR: No pulse. Pulse drops <60 with poor perfusion despite oxygenation (Recheck pulse every 2 minutes).
2. Post ROSC care includes: Transport patient supine with continual reassessment of ABC's for any changes and vital signs every 5 minutes including Blood Glucose level. Leave AED attached to patient, with power on.

Adapted from: Atkins, D. Berger, S. Duff, J *et al* (2015). Part 11:Pediatric Basic Life Support and Cardiopulmonary Resuscitation Quality in 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* (132) 519-525

Cardiac Arrest Protocol Guidelines

Situations in which resuscitation should not be attempted

Trans-section of the body	Decapitation
Inability to treat pulseless patient due to prolonged extrication	Cardiac arrest with an open skull fracture or brain tissue extrusion
Verified DNR	Decomposition

General Management

- If another AED machine is in place, exchange it with the paramedic's AED. Leave pads in place if compatible. Only change machines during a 2-minute cycle of CPR.
- Press 'Analyze' when AED prompts you. During analyze: switch compressors and assess for a carotid pulse.
- If AED states 'shock advised' and begins to charge, compress while 'charging' then clear before defibrillating. If the AED states 'no shock advised', immediately resume chest compressions.
- Continue 2 minutes of CPR
- Continue with A & B interventions
- Insert an OPA/NPA and attach 15 lpm O2 to BVM
- Continue to analyze and defibrillate as required, changing compressors every 2 mins to ensure high quality CPR
- Consider treatable causes
- Consider the insertion of an EGD

When to Transport

- Determined a treatable cause that is best treated in hospital (See Reversible Causes Hs & Ts under Special Conditions)
- After return of spontaneous circulation (ROSC) and post-arrest care measures have been completed
- When directed by Medical Direction

After 15 minutes of high quality CPR and AED

- Call Medical Direction and discuss treatment options, which may include:
- Continuing CPR and AED en route (stopping vehicle and analyzing every 5 minutes)
- Discontinuing CPR
- Continuing CPR/AED on the scene for a prescribed amount of time and then either stopping CPR or transporting

If directed to transport:

- Continue CPR and immediately prepare the patient for transport using either the clamshell or extrication board.
- While your team is loading the patient, ensure that all critical Hx has been obtained and that high quality CPR is maintained.
- Enlist a First Responder to assist in case patient re-arrests, and leave the AED attached to the patient.
- Every 5 minutes, stop the ambulance, stop CPR and press ANALYZE:
  - If 'no shock' advised resume CPR and continue to transport.
  - If 'shock advised' defibrillate the patient, stay and continue 2 person CPR/defibrillations as per the cardiac arrest protocol (Analyzing every 2 min). When a single 'no shock' is advised, continue CPR and transport to the hospital. Re-analyze every 5 minutes.
  - If pulse is present, reassess ABCs, intervene as necessary and continue transport to hospital. Monitor the pulse constantly, being alert for your patient to re-arrest.

Cardiac Arrest Protocol Guidelines - continued

Post ROSC Care

Following the return of spontaneous circulation:

- Continual assessment of ABCs including any interventions that were introduced (adjuncts, EGD placement)
- Full set of vital signs including 3 lead and 12 lead if equipment available
- Anticipate re-arrest & preparation of resuscitation equipment
- Transport to higher level of care
- Begin focused history and physical examination & critical history

Discontinuation of Resuscitation

Continue resuscitation until the following criteria have been met:

- An attempt to contact a Medical Direction has been made, and
- CPR has been continued for greater than 30 minutes without return of spontaneous circulation (ROSC) at any time during this time period.
- If a Medical Direction cannot be contacted, discontinue resuscitation attempts after 30 minutes and document time.
- If you find any of the reasons mentioned above to discontinue ('Situations in which resuscitation should not be attempted').

Paramedics are expected to modify the procedures in those cases where a more favourable outcome may be expected (e.g. children, hypothermia). Modification will be made only if it is in favour of the patient and after consultation with a Medical Direction.

Confirming Death (both PCPs should complete these assessments)

- Check carotid pulse
- Auscultate heart sounds for 1 minute
- Auscultate lung sounds for 1 minute
- Check pupils
- Assess for dependent lividity

Special Conditions

Extraglottic Device (King Airway, IGEL)

Consider using an extraglottic device for cardiac arrest/post arrest. Ensure this is done AFTER good quality chest compressions have been started and maintained, the Cardiac Arrest Protocol is underway, the patient's airway is maintained, ventilations with oxygen have begun and suction is ready. Also, ensure that the initial assessment is complete and that critical history has been obtained. The EGD will aid in good ventilation of the patient but its insertion should be after 3 cycles of CPR/Analyze and not interfere with good quality CPR and the Cardiac Arrest Protocol. In the case of a failed airway, an extraglottic device may be considered earlier.

Cardiac Arrest Protocol Guidelines - continued

Reversible Causes

Hypoxia	Toxins
Hypovolemia	Tamponade
Hydrogen Ions (Acidosis)	Thrombus (coronary or pulmonary)
Hypothermia	Tension pneumothorax
Hypo/Hyperkalemia	

Reversible Causes specifics:

Severe Hypothermia

Basic life support measures for the severely hypothermic patient should focus on rapid transport and maintaining CPR en route.

Prior to transporting, an attempt to contact Medical Direction should be made. Contacting Medical Direction may take time and the attendant should take this into consideration when initiating contact. If Medical Direction cannot be contacted, load and transport continuing CPR and AED en route.

Traumatic Arrest

Traumatic arrests that are in a shockable rhythm should be initially shocked on scene. Prior to further analyzing/ defibrillation, consider:

- Cause of the arrest
- Circumstances of the arrest
- Age of the patient
- Distance to hospital

The focus of basic life support for traumatic arrest patients is on the management of airway, breathing and circulation. Be aware that some adaptions will have to be made for these patients: when multisystem trauma is present or trauma involves the head and neck, the cervical spine must be stabilized. A jaw thrust should be used instead of a head tilt–chin lift to establish a patent airway. Ventilation with a bag-valve-mask should also focus on maintaining cervical spine stabilization. Direct someone to stop any visible hemorrhage using direct pressure and dressings.

If no pulse is palpable, begin CPR and prepare for immediate transport. Have your teammates do high quality CPR, 'analyze' and check the cardiac rhythm using the AED.

Go to P.O.M.
- Chest Pain

Cardiac Chest Pain Protocol

INDICATIONS

Patients who present with cardiac type chest pain/discomfort, have a history of heart disease and would normally take their prescribed Nitroglycerin for their symptoms OR

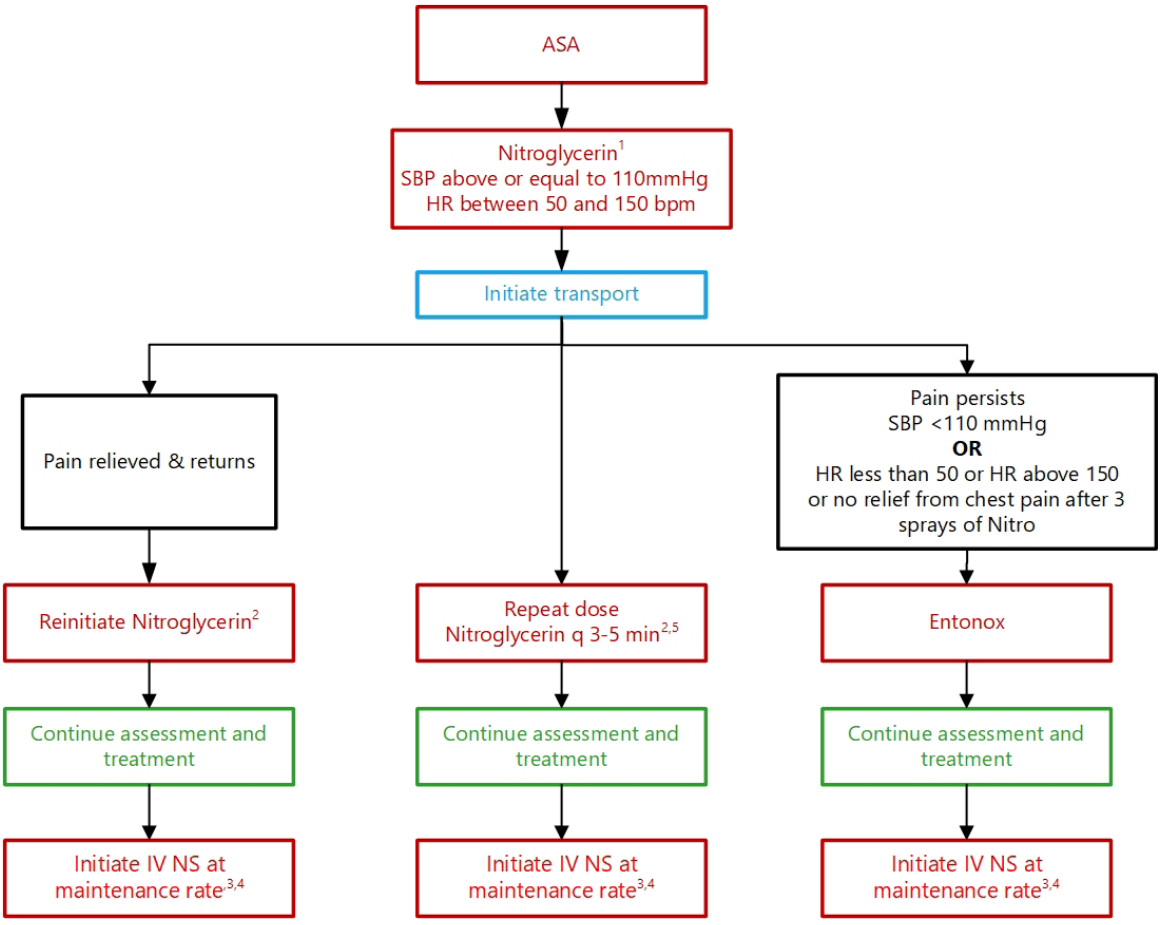
First episode suggestive of cardiac chest pain/discomfort who do not have a prescription for Nitroglycerin[2]

CONTRAINDICATIONS

Refer to *BCEHS Handbook* for drug monographs for: Aspirin (ASA), Dimenhydrinate (Gravol), Nitroglycerin, Nitrous Oxide (Entonox), Normal Saline (N/S)

Before initiating the Cardiac Chest Pain Protocol, you must:

- Complete an initial assessment and consider the administration of oxygen
- Obtain a history sufficient to suggest pain is cardiac in nature including medical history, medications, and allergies
- Investigate the pain complaint including severity using OPQRST
- Rule out any medication contraindications
- Consideration should be given to the nature of chest pain (not worsened by pressure, palpation or movement)
- Do not delay administering Aspirin. Obtain a baseline set of vitals prior to administering nitroglycerin. [1,2]



1. If patient does not have a prescription to Nitroglycerin, mandatory consult with Medical Direction must be made.
2. Maximum 3 doses of Nitroglycerin and then mandatory consult with Medical Direction for further orders.
3. When considering IV access – the left arm should be first access if possible, in anticipation for PCI.
4. Dimenhydrinate may be considered for treatment of nausea and/or vomiting. Nausea and Vomiting Protocol.
5. If the patient's systolic or diastolic BP drops 20 mmHg or more after administration of any Nitroglycerin dose, it is recommended to contact the Medical Director prior to further Nitroglycerin to prevent hypotension or an unpredictable drop in BP.

Cardiac Chest Pain Protocol Guidelines

The Cardiac Chest Pain Protocol is indicated for patients with cardiac type chest pain and/or discomfort. If the patient is not prescribed Nitroglycerin, a mandatory consult with Medical Direction must be made prior to administration of Nitroglycerin. Both ASA and Nitrous Oxide (Entonox) can be used for chest pain following indications and contraindications listed in the *BCEHS Handbook* for drug monographs.

Definitions

Angina Pectoris: Chest pain that results when the oxygen supplied to the heart does not meet the demand.

Myocardial Infarction: Death and subsequent necrosis of the heart muscle caused by inadequate blood supply.

Classic chest heaviness with radiation to the arms or jaw, shortness of breath and sweating only occur in about 30% of patients with ACS. Diabetics and women can have "atypical" pain complaints, or minimal complaints.

Goal of Care

Consider any patient with cardiac chest pain to be Priority and initiate transport as soon as possible. Early administration of ASA is important and should be administered as soon as a provisional diagnosis of cardiac-type chest pain and the safety of administration is determined.

The crew (driver and fire) should be utilized to assist in preparation for loading (e.g. golden slipper to MLS) while the attendant is completing the initial assessment, obtaining a pertinent history to determine the chest pain is cardiac in nature, and ensuring ASA is appropriate for this patient (including the indications/contraindications and 6R's for safe administration of ASA).

If the pain presents typical for the patient's angina, the patient may receive Nitroglycerine on scene prior to transport (a full set of vitals must be obtained as well as indications/contraindications and safety for nitro administration).

If the patient presents with cardiogenic shock, heart failure, an MI, or a presentation that is different from their usual angina, then Nitroglycerine should be administered en route (if indicated).

Guiding Principles

Consider appropriate patient position when administering Nitroglycerin. Nitroglycerin causes vasodilation and may cause a drop in blood pressure, dizziness or even collapse. If necessary place the patient seated on the cot prior to administering Nitroglycerin.

If the patient's BP falls below target 110 mmHg or patient presents with hypoperfusion (slow, weak or absent radials, altered mental status, and/or light-headedness):

- Discontinue the Cardiac Chest Pain nitro administration, no further nitro administration should be administered prior to consultation with Medical Direction.
- Lower the head of the stretcher as low as possible considering any shortness of breath/pulmonary edema, cardiogenic shock should be considered.
- Reassess the ABCs and obtain a set of Vital Signs.
- After five minutes, reassess the patient. You may administer Entonox if the pain persists and is indicated.

Cardiac Chest Pain Protocol Guidelines - continued

Other Considerations

Ischemic chest pain accompanied by bradycardia, nausea and/or vomiting:

In cases of ischemia or infarction involving the inferior portion of the myocardium, there is a high incidence of parasympathetic influence and is characterized by bradycardia and GI complaints. Inferior wall MI is often associated with right ventricular involvement. (Recent studies and literature suggest as high as 50 – 60 % of cases). The right ventricle is responsible for providing the necessary preload to the left ventricle, which can be significantly reduced where there is right ventricular wall dysfunction from MI. The consequences of RVMI are lowered cardiac output from preload reduction and reduced stroke volume. This can lead to cardiogenic shock, as well as hemodynamic related myocardial hypoperfusion.

Although the definitive diagnosis is achieved through right-sided ECG findings, echocardiography and angiography, the clinical findings of relative hypotension, bradycardia and GI symptoms should alert the paramedic to the probability of right ventricular involvement. This type of MI dictates the need for an unconventional treatment plan as standard nitroglycerin treatment has shown to result in poor patient outcomes and increased mortality. In hospital treatment focuses on fluid administration, positive inotropic agents and early coronary reperfusion, while nitrates are avoided.

Nitrates primary action is vasodilation through relaxation of the smooth muscle in the tunica media of vessels. When nitrates are administered in the case of angina, the associated vasodilation will result in preload and afterload reduction therefore reducing the myocardial workload in order to achieve relief of the ischemic pain. However, nitrate use in the setting of RVMI can cause hemodynamic compromise, increased dysrhythmias and extend the area of infarction.

When a patient presents with the clinical findings to support right ventricular involvement and only minimally meets the threshold BP, extreme caution should be taken and consultation with Medical Direction may be warranted.

Principles of Oxygenation

The goal is to have the patient's oxygen saturation greater than 95%. The application and continued use of high flow oxygen may be required if the patient exhibits signs of shock. An alternate method of oxygen delivery may be used to maintain adequate perfusion and oxygenation (e.g. Nasal Cannula at 4 - 6 lpm).

Full Reassessment of Indication for Protocol

Full Reassessment of Indications **PRIOR** to Additional Doses of Medication – Reassess All below					
Blood Pressure – Systolic and diastolic	Pain Scale	HR			

Go to P.O.M.
- Hypo or Hyper Glycemic Events

Hypo or Hyper Glycemic Events Protocol

INDICATIONS

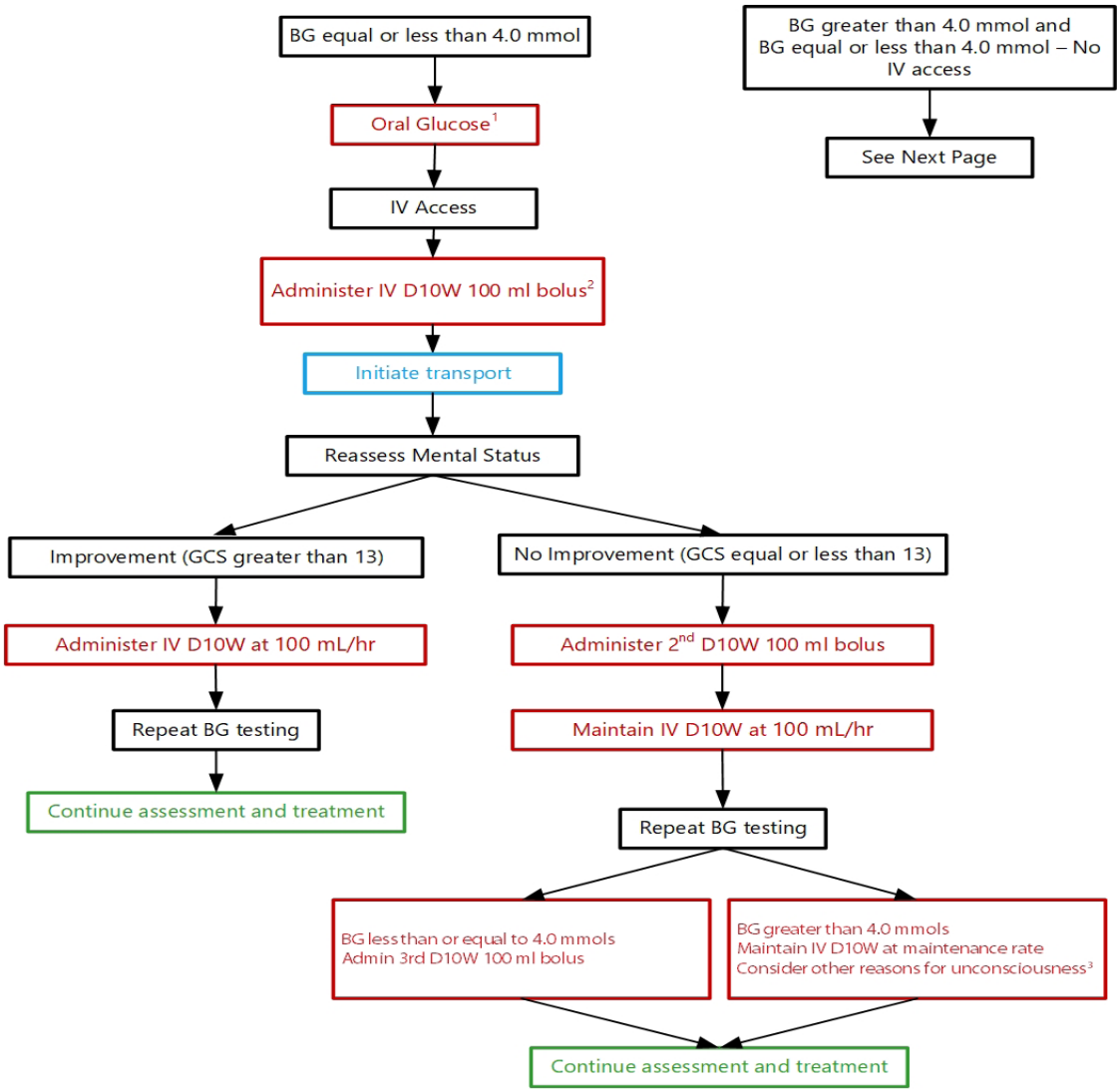
- Patients with decreased mental status whose history suggest hyperglycemia or hypoglycemia.

CONTRAINDICATIONS

Refer to *BCEHS Handbook* for drug monographs for: Dextrose D10W 10%, Glucagon, Normal Saline (N/S), Oral Glucose

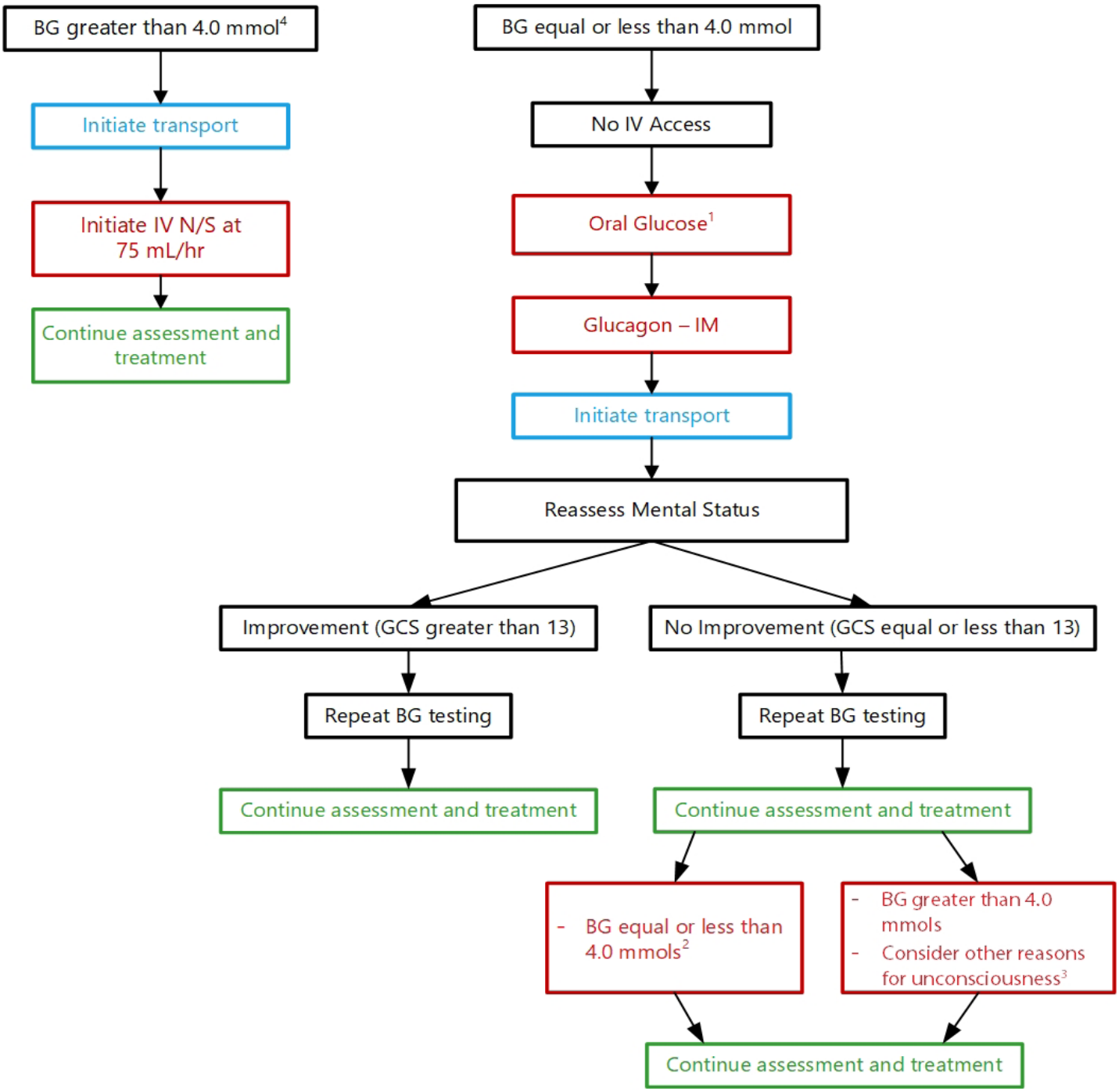
Before initiating the Hypo or Hyper Glycemic Events Protocol, you must:

- Complete an initial assessment and administer oxygen
- Obtain signs and symptoms of Hypoglycemia or Hyperglycemia
- Obtain critical history including medical history, medications, and allergies
- Rule out any medication contraindications
- Obtain a baseline set of vital signs



1. Must be able to maintain their own airway and swallow. See product packaging for specific grams of glucose per total weight.
2. If no history of diabetes, it is recommended to perform a BGL every 100 ml.
3. Consider 'AEIOUTIPS' as a cause of decreased level of consciousness if no response to treatment.

Hypo or Hyper Glycemic Events Protocol - continued



1. Must be able to maintain their own airway and swallow. See product packaging for specific grams of glucose per total weight.
2. Reassess patient for IV access, and if successful, proceed to Hypo or Hyper Glycemic Events Protocol on previous page.
3. Consider 'AEIOUTIPS' as a cause of decreased level of consciousness if no response to treatment.
4. Obtain a diagnosed history of diabetes.

Hypo or Hyper Glycemic Events Protocol Guidelines

The Hypo or Hyper Glycemic Events Protocol is indicated for patients with known diabetes and decreased mental status.

Definition

The most likely cause of decreased mental status in a known diabetic patient is hypoglycemia. Signs and symptoms may include:

Autonomic	Neuroglycopenic
Trembling	Difficulty concentrating
Palpitations	Confusion
Sweating	Weakness
Anxiety	Drowsiness
Hunger	Vision changes
Nausea	Difficulty speaking
Tingling	Headache, Dizziness

Goal of Care

For the hypoglyceamic patient, the goal is to increase the patient mental status. If hyperglycemic, they will require urgent transport for appropriate care in hospital.

As the brain begins to receive glucose, the GCS of the patient will increase. Factors such as age, body mass and underlying medical conditions will all contribute to both the time scale over which effects are noticed and the degree of change brought about.

Improvement in mental status to GCS greater than 13 in response to treatment is defined as any noticeable increase to the patient's GCS. Initial improvement does not require the patient returning to a 4,5,6 on the GCS, but rather noticeable improvement in their mental status. If the patient is still exhibiting signs and symptoms of moderate to severe hypoglycemia, continue with further assessment, additional glucometric testing and continue with D10W as required by the protocol.

Patients who have had their hypoglycemia reversed should still be transported to hospital. These patients require reassessment of their condition by a physician as there may be an underlying cause. For example, infection, medication problems, or progression of the disease.

Guiding Principles

Oral Glucose should be considered when there is no concern for airways compromise. Patient must be able to follow commands and be able to swallow. Oral glucose is best absorbed when the patient can swallow the gel into the stomach but can be placed in the buccal pouch for a patient with a decreased mental status.

Blood glucose should be rechecked every 100 mls of D10W in the patient without a history of diabetes.

Glucagon is a pancreatic hormone that, together with insulin, helps to maintain normal blood sugar levels. Glucagon acts on liver glycogen, converting it to glucose (glycogenolysis), increasing blood glucose levels.

If you are unable to obtain an IV and give D10W, administer IM Glucagon. Glucagon may take up to 20 minutes to take effect. If there is no improvement after 15 minutes, consider other causes of unconsciousness.

- If there has been no improvement with the administration of Glucagon and the repeat glucometer result is ≤ 4.0 mmol/L, give oral glucose again. Do NOT administer more Glucagon.

Full Reassessment of Indication for Protocol

Full Reassessment of Indications **PRIOR** to Additional Doses of Medication – Reassess All below					
1st and 2nd – Reassess LOC	2nd and 3rd – Reassess BGL and GCS				

Fluid Resuscitation Protocol

Go to P.O.M.

- Abdominal Pain
- Environmental
- Neurological
- Obstetrical
- Toxicological
- Significant Mechanism
- Blunt Abdominal
- Blunt Chest
- Burns
- Extremity Injuries
- Penetrating Injuries
- Head, Face & Neck

INDICATIONS

- Signs or symptoms of hypotension, hypoperfusion, or hypovolemia due to fluid loss - internal, external or fluid shift; or
- Anticipation of shock due to mechanism of injury; or
- Patients with burns greater than 20% BSA (partial thickness and full thickness)

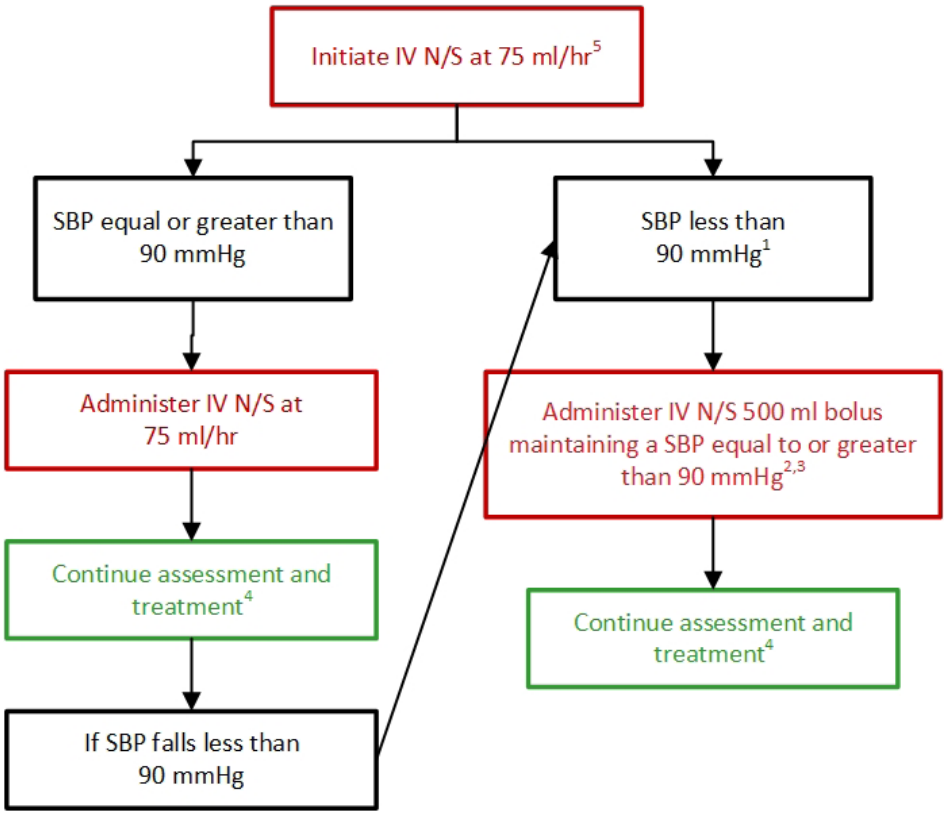
CONTRAINDICATIONS

Refer to *BCEHS Handbook* for drug monographs for:

- Normal Saline (N/S)
- Tranexamic Acid (TXA)

Before initiating the Fluid Resuscitation protocol, you must:

- Complete an initial assessment and administer oxygen
- Obtain critical history including medical history, medications, and allergies
- Rule out any medication contraindications
- Initiate Transport
- Obtain a baseline set of vital signs including oxygen saturation



1. Protocol targets those patients who present with blood/fluid loss. It is important to distinguish between hypovolemia and hypotension. Hypotension may also be attributed to cardiac dysfunction, obstructive shock, metabolic disturbances and conditions relating to poor vascular tone, treatment with fluid may cause worsening of the condition and poor patient outcomes.
2. Before and after each 500 mL N/S bolus, auscultate the lung bases. If signs and symptoms of pulmonary edema are present, administer N/S at 75 ml/hr.
3. In hypovolemia, maintain a systolic BP of 90 mmHg. Administer a maximum of 2000 mL, assessing after each 500 mL bolus. Consider contacting Medical Direction for further orders.
4. TXA should be considered, refer to TXA protocol for indications - must take into consideration additional injuries.
5. Start a 2nd IV in other arm, if appropriate.

Fluid Resuscitation Protocol Guidelines

The Fluid Resuscitation Protocol is indicated for the following:

- Signs or symptoms of hypotension, hypoperfusion, or hypovolemia due to fluid loss - internal, external or fluid shift; or
- Anticipation of shock due to mechanism of injury.
- Patients with burns greater than 20% BSA

Definition

Hypovolemia is a condition where vascular volume is diminished sufficient to cause shock. Sources of hypovolemia include hemorrhage (internal or external), major burns (plasma loss), profound and prolonged sweating, vomiting, or diarrhea. Note that a single episode of vomiting or diarrhea is not usually sufficient to lead to hypovolemia.

It is important to distinguish between hypovolemia and hypotension. Hypotension is a clinical state of lowered blood pressure, which may result from hypovolemia but may also be attributed to cardiac dysfunction, obstructive shock, metabolic disturbances and conditions relating to poor vascular tone. IV access and fluid administered for these causes of hypotension may cause worsening of the condition and poor patient outcomes. The Fluid Resuscitation Protocol targets those patients who present with blood/fluid loss.

Goal of Care

The goal of treatment is to provide fluid resuscitation to patients that are hypovolemic or anticipation of volume loss.

Guiding Principles

A fluid bolus is a determined volume (e.g. 500 ml) administered rapidly in order to provide a quick boost to the patient's vascular volume. Fluid boluses are given to those who have clinical hypotension from fluid loss and present with a systolic blood pressure below 90 mmHg. At times the fluid loss is not evident and must be suspected from the mechanism or history. The provider must recognize other clinical signs such as pallor, diaphoresis, pulse pressure narrowing, tachycardia and other compensatory signs indicating fluid loss. Keep in mind that the goals of IV fluid boluses in trauma are to;

- Target a systolic blood pressure greater than or equal to 90mmHg.
- For Head trauma, maintain blood pressure, target MAP of 85-90 mmHg or systolic of 120mmHg. Do not exceed 2 L total volume fluid administration.

The presence of a BP equal or greater than 90 mmHg is not sufficient to treat a patient as Non-Priority. You must consider the mechanism of injury, the nature and extent of injuries and the presence of other clinical signs of shock in determining whether to treat a patient as Priority. When the patient's BP equal or greater than 90 mmHg, but you anticipate shock, treat the patient as Priority, transport, and administer NS at maintenance rate en route. This prophylactic procedure is beneficial in that a bolus can readily be administered if the systolic blood pressure falls below 90 mmHg.

Explain the rationale for using the Fluid Resuscitation Protocol for patients with major burns.

Burns alone do not usually cause hypovolemia in the pre-hospital setting. Major burns can lead to hypovolemia over several hours due to plasma loss. Manage patients with major burns (greater than 20% BSA) by administering N/S at 75 ml/hr if BP equal or greater than 90 mmHg.

Fluid Resuscitation Protocol Guidelines - continued

If you find hypotension in a patient with major burns, you should look for another source of hypovolemia such as internal bleeding.

Rationale for assessing for pulmonary edema after each bolus of NS.

Pulmonary edema may occur if too much fluid is infused, leading to circulatory overload. Assess the patient for signs of pulmonary edema after each bolus of 500 mL NS by auscultating the chest. Other signs of pulmonary edema may include increasing shortness of breath, increasing pallor, JVD and cyanosis.

Sepsis (SIRS) and Septic Shock Protocol

Sepsis or Systemic Inflammatory Response Syndrome (SIRS) is responsible for more than 30,000 hospital admissions each year in Canada. More than 30% of these patients will die. Traditional pre-hospital management of sepsis has been largely supportive until such a time as the patient becomes hypotensive (Septic Shock).

Multiple studies have shown a direct correlation between onset of in-hospital treatment and survival rates. As a result many emergency departments have well established SIRS protocols. A new trial is underway in BC to examine the effect of paramedic initiated treatment on normotensive (systolic BP greater than 90) patients with signs and symptoms of SIRS.

Pathophysiology

Sepsis is the result of a systemic infection triggering an inflammatory response in the body. The terms sepsis and SIRS are often used interchangeably despite the fact that SIRS may be a result of other causes such as trauma or burns.

Sepsis occurs as a result of the body's release of inflammatory mediators (cytokines) intended to combat infection. Under normal conditions cytokines help to recruit other immune cells and are limited in their effect.

During prolonged or severe infections the release of cytokines and other inflammatory mediators becomes unregulated and they quickly amass in the blood. In addition, the bacteria themselves may release damaging toxins into the tissues or bloodstream. The combined effect triggers vasodilation, vessel injury and may directly activate the coagulation cascade.

If left untreated, sepsis will lead to hypotension (septic shock), multiple organ dysfunction syndrome and eventually death.

BC Sepsis Guidelines

In 2017 the BC Sepsis Network was created to improve awareness and consistency of treatment of septic patients. The following guidelines are for adult septic/septic shock patients.

Patients with known or suspected infection and 2 or more of the following SIRS criteria:

- Heart rate greater than 90 BPM
- Respiratory rate greater than 20 BPM
- Temperature equal or higher than 38° C or less than 36° C
- Altered mental status

AND 1 or more of the following:

- Looks unwell
- Age 65 or older
- Recent surgery
- Immunocompromised (AIDS, Chemotherapy, neutropenia, asplenia, transplant, chronic steroids)
- Chronic illness (diabetes, renal failure, hepatic failure, cancer, alcoholism, IV drug use)

Fluid Resuscitation Protocol Guidelines - continued

Patients with suspected SIRS or sepsis who are identified using these guidelines receive immediate treatment known as Early Goal Directed Therapy (EGDT). EGDT generally consists of NS fluid bolus, rapid blood work (to identify infection source and lactate levels) and antibiotic administration.

Pulmonary Edema

If you find evidence of pulmonary edema, stop the fluid bolus and administer NS at maintenance rate.

Fluid Resuscitation Protocol for patients with Suspected Traumatic Brain Injury

The goal for a hypotensive TBI patient is to be cautious with fluid but to achieve a blood pressure high enough to ensure cerebral perfusion (target of SBP 110 - 120 mmHg). In most cases of isolated TBI the blood pressure will be elevated; however, these guidelines are for those multi-trauma situations where other body systems are affected as well.

IV Fluid in Trauma

Trauma can result in both internal and external blood loss. Trauma can also be categorized into blunt or penetrating trauma. Traditional treatment, after tamponade of the obvious sources of blood loss, is to administer boluses of an IV crystalloid solution to support the blood pressure and compensate for blood loss. With significant blood loss there is not only a reduction in overall volume but loss of crucial cells within the blood such as hemoglobin, platelets and various electrolytes that maintain homeostasis. Administering crystalloid fluid can increase the overall vascular volume to restore blood pressure and help provide delivery of oxygen and nutrients to the body tissue and organs.

A crystalloid solution such as normal saline is isotonic and therefore has the same concentration of solute that plasma does. Due to this fact, it does not shift into the cellular compartments but tends to remain in the extracellular compartments and will increase vascular volume. The paramedic must be cautious with cardiac patients and those suffering from renal diseases as fluid overload can rapidly cause pulmonary edema. Accurate gathering of history, patient assessment and consideration of mechanisms should allow the paramedic to determine hypovolemia as the cause of hypotension in the trauma patient.

Permissive hypotension

This is a concept that has been a focus of numerous studies recently. It is believed, and is evidenced in many cases that large amounts of IV crystalloid solution can be detrimental in the outcome of trauma patients.

It is suggested that this is due to clot disruption, dilution of platelets and prolonging a hemorrhage source through increased hydrostatic pressure. Permissive hypotension may reduce some of these fluid resuscitation consequences but to date, the data and research is still considered inconclusive. Administration of normal saline boluses have been altered in the PCP protocol to promote a more conservative approach, with Medical Direction determining the extent of overall IV fluid in cases of refractory hypotension in trauma cases.

Normal saline

0.9% saline is considered as normal saline and is isotonic. Initially when administered IV, it will not shift to the intracellular space but will remain in the intravascular and interstitial compartments. Normal saline does not contain blood products and therefore does not possess oxygen carrying capacities. 5.0 is the average pH of normal saline. Platelets are not contained in normal saline. Although the solution is recommended for initial fluid boluses, be aware that large volumes can promote acidemia, dilution of platelets and if not warmed, hypothermia.

Fluid Resuscitation Protocol Guidelines - continued

Sepsis and the Fluid Resuscitation Protocol

The Fluid Resuscitation protocol should be initiated on any patient who is hypotensive with a recent history of infection. Hypotension in sepsis may be caused by vasodilation. The goals of fluid administration are to restore perfusion and dilute the toxins causing inflammation. For these reasons sepsis patients have lower complication rates from saline administration then patients suffering from hemorrhagic shock.

Patients in septic shock require immediate and aggressive fluid resuscitation (500 ml boluses to a maximum of 1 L) to achieve a minimum systolic blood pressure of 90 mmhg. Additional orders for fluid may be sought if the patient is still hypotensive after receiving 1 L.

Obstructive, Distributive or Cardiogenic Shock

Not all hypotension will benefit from the use of isotonic solution. There is an increased risk of fluid overload in patients experiencing obstructive, distributive or cardiogenic shock. Due to this increased risk, it is mandatory to call Medical Direction to discuss the risk vs. benefits of fluid replacement in sustained hypotension.

Full Reassessment of Indication for Protocol

Full Reassessment of Indications **PRIOR** to Additional Doses of Medication – Reassess All below					
Blood Pressure	Auscultation -- lung bases (to assess for fluid overload)				

Intracranial Pressure (ICP) Protocol

INDICATIONS

- Signs or symptoms consistent with Intracranial pressure secondary to trauma or stroke[1]

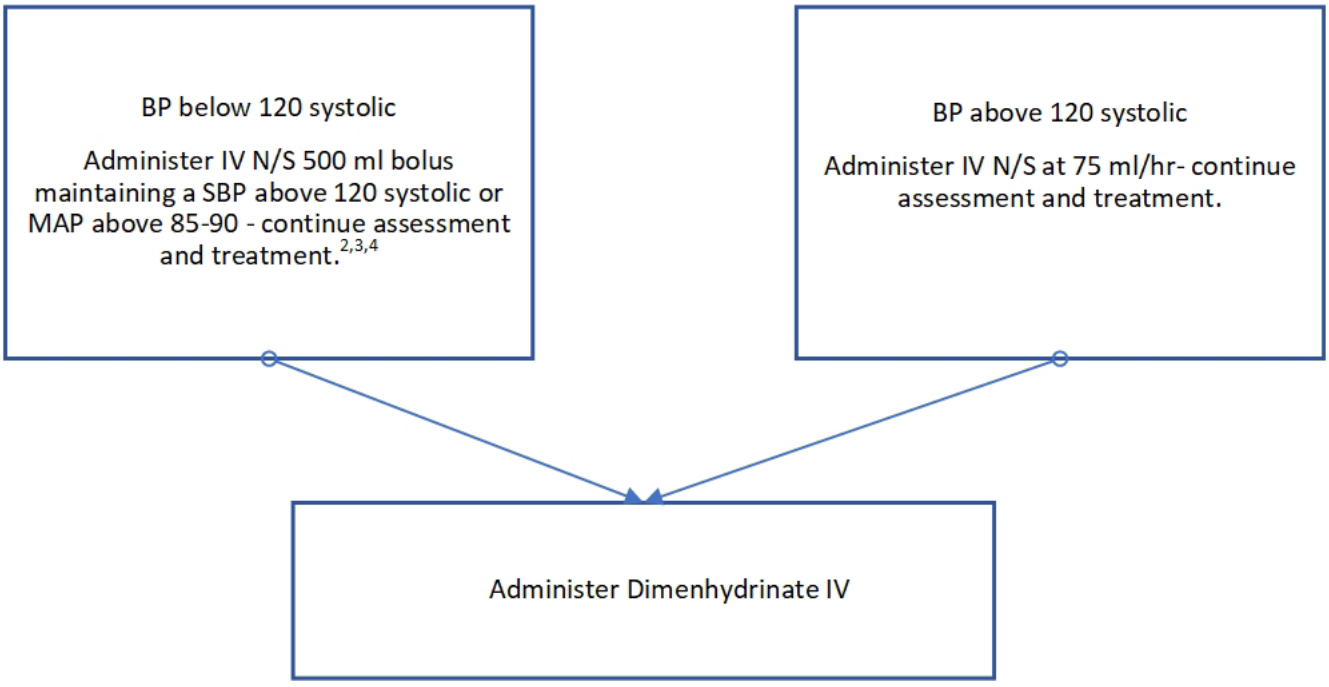
CONTRAINDICATIONS

Refer to *BCEHS Handbook* for drug monographs for:

- Normal Saline (N/S)
- Dimenhydrinate (Gravol)

Before Initiating the Intracranial Pressure Protocol, you must:

- Complete an initial assessment and administer oxygen
- Obtain critical history including medical history, medications, and allergies
- Rule out any medication contraindications
- Initiate Transport[5]
- Obtain a baseline set of vital signs including oxygen saturation



1. Signs of intracranial pressure may include Decorticate or Decerebrate posturing / abnormal pupils / Signs of Cushing triad/ Nausea.
2. Before and after each 500 mL N/S bolus, auscultate the lung bases. If signs and symptoms of pulmonary edema are present, administer N/S at 75 ml/hr.
3. Administer a maximum of 2000 mL, assessing after each 500 mL bolus. Consider contacting Medical Direction for further orders.
4. TXA should only be considered if there is a suspicion of other occult bleeding. TXA is not recommended for isolated TBI's, refer to TXA protocol for indications.
5. Patients exhibiting signs of Intercranial pressure should be positioned at 30 degrees

Go to P.O.M.
- Abdominal
- Chest Pain
- Environmental

Nausea and Vomiting Protocol

INDICATIONS

Prevention and treatment of nausea, vomiting or vertigo[1]

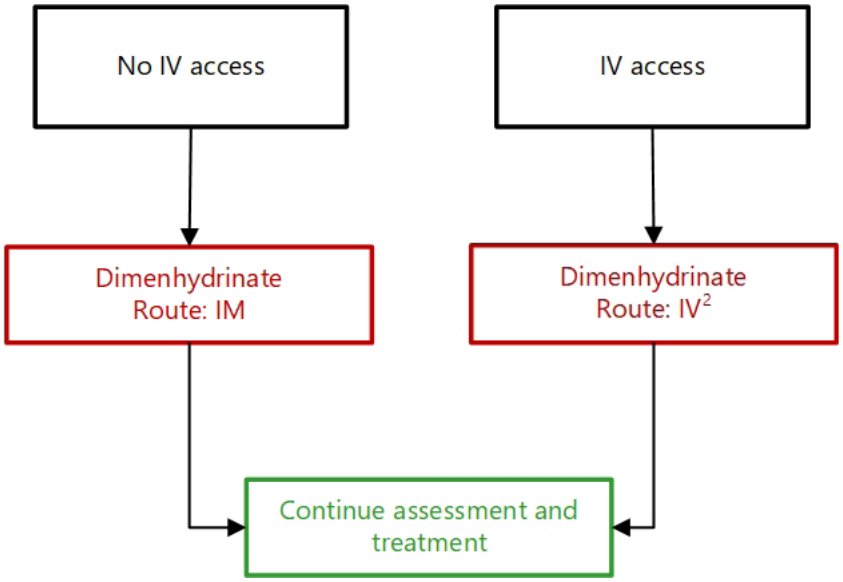
CONTRAINDICATIONS

Refer to *BCEHS Handbook* for drug monographs for:

- Dimenhydrinate (Gravol)
- Normal Saline (N/S)

Before initiating the Nausea & Vomiting protocol, you must:

- Complete an initial assessment and administer oxygen
- Obtain a chief complaint of nausea, vomiting or past history of motion sickness
- Obtain critical history including medical history, medications, and allergies
- Rule out any medication contraindications
- Obtain a baseline set of vital signs



1. Contact Medical Direction if patient appears to be under 25 Kg.
2. Dilute with normal saline and inject over 1-2 minutes (max 25 mg per min) e.g. If administering 50 mg of Dimenhydrinate for IV injection, draw up 50 mg of Dimenhydrinate using a 10 mls syringe, then draw up the additional 9 mls of normal saline. Tilt the syringe to mix the medications and administer slowly over 2 minutes (25 mg per minute).

Nausea and Vomiting Protocol Guidelines

The Nausea and Vomiting Protocol is indicated for patients who require treatment of nausea, vomiting, or vertigo.

Definition

Nausea and vomiting may be from motion sickness or as a symptom of an illness. The causes of nausea and vomiting are diverse and may include:

- MI
- Stroke
- DKA
- Sepsis
- Biliary disease/bowel obstructions
- Gastrointestinal disorders
- Pregnancy
- Electrolyte disturbances
- Overdoses/CO poisoning

Vertigo (a perceived sensation of motion that is often described as spinning or whirling) is often accompanied by sweating, pallor, nausea, vomiting, and balance issues. Vertigo is caused by many different factors including Meniere's disease, migraines, labyrinthitis, multiple sclerosis, tumors, etc.

Goal of Care

The goal of treatment is to relieve symptoms of nausea and vomiting. Dosage of dimenhydrinate is based on weight in kilograms.

Guiding Principles

Patients who have a decreased level of consciousness and are vomiting are at risk for aspiration. Position these patients semi-recumbent, or in a position of comfort, for airway protection.

Dimenhydrinate is rarely indicated in children but may be necessary for rural prehospital response. Contact Medical Direction for special case scenarios.

Other Considerations

Elderly Patients - Gravol may be inappropriate in older adults depending on comorbidities (e.g. dementia, delirium) due to the anticholinergic effects.

Full Reassessment of Indication for Protocol

Full Reassessment of Indications **PRIOR** to Additional Doses of Medication – Reassess All below					
Dosage – Has maximum dose been given	Still symptomatic -- need for more up to maximum dose				

Go to P.O.M.
- Abdominal Pain
- Chest Pain
- Obstetrical
- No Significant Mechanism
- Significant Mechanism
- Blunt Abdominal
- Burns
- Extremity Injuries
- Penetrating Injuries
- Head, Face & Neck

Pain Management Protocol

INDICATIONS

- Pain

CONTRAINDICATIONS

Refer to *BCEHS Handbook* for drug monographs for:

- Acetaminophen (Paracetamol / Tylenol)
- Ibuprofen
- Nitrous Oxide (Entonox)

Before initiating the Pain protocol, you must:

- Complete an initial assessment and administer oxygen
- Obtain critical history including medical history, medications, and allergies
- Investigate the pain complaint including severity using OPQRST
- Rule out any medication contraindications (by conducting a thorough physical exam)
- Obtain a baseline set of vital signs
- Prior to Entonox turn on vehicle ventilations system (intake and output)

Explain to patient:

- Entonox is self-administered[1]
- Effects of analgesics
- Possible side effects

Administer Entonox

- Patient uses until pain is relieved or side effects appear.[2,3]

Monitor and record

- Start and stop times of Entonox (lbs. of pressure administered)
- Patient response

Acetaminophen & Ibuprofen Administration

- The administration of acetaminophen and Ibuprofen can be considered for low-acuity non traumatic pain management. Its important to note the delayed therapeutic onset of these drugs, so clinical judgment needs to be utilized. Refer to *BCEHS Handbook* for drug monographs for administration information.

1. Let patient self-administer. DO NOT assist. If patient becomes sedated DO NOT assist with continued application.
2. Patient should receive supplemental oxygen when entonox is discontinued.
3. Discontinue if cyanosis develops.

Pain Management Protocol Guidelines

Components of an Entonox Apparatus

Ensure that you are familiar with the following components of an Entonox apparatus:

- Entonox cylinder
- Medical post
- Pressure gauge
- Demand regulator
- Expiratory valve assembly
- Inspiratory port
- Disposable Mouth Piece
- N95 Air Filter

The following section outlines the use of an Entonox apparatus.

Explain the procedure to the patient, including:

- The effects of Entonox.
- The possible side effects of Entonox.
- The fact that Entonox is self-administered.
- Describe how to use the mouth piece; how it is similar to a dive regulator and how to trigger the device.
- Ensure that the area is well ventilated. If you are in an ambulance, turn on the necessary fans and have your partner close her/his window .
- Prepare Entonox by inverting the tank three times to mix the gases.
- Open the valve on the medical post.
- Instruct the patient to self-administer the Entonox.

After Entonox Use:

- Supplemental oxygen should be applied to the patient after Entonox use is terminated. (Alveolar oxygen displacement can result in a temporary period of hypoxemia after Entonox use).
- Close the valve on the medical post.
- Expel the residual gas in the line by pressing the positive pressure button on the delivery apparatus or loosening the connector on the delivery tubing.
- Discard the used mouthpiece and air filter.
- Store Entonox safely and appropriately by company policy and procedure.

Pain Management Protocol Guidelines - continued

Indications and Types of Calls

The Pain Management Protocol is indicated for patients in pain. Refer to your protocol for the most current list of contraindications and cautions. Check the footnotes and guidelines for additional information on the types of patients and conditions that the Pain Management Protocol is indicated for.

The following is a list of calls that you are most likely to use the Pain Management Protocol for.

- Minor trauma
- Burns - Superficial, partial thickness or full thickness
- Obstetric patients and emergency childbirth
- Chest pain
- Abdominal pain
- Back pain

Documentation

- Document that the patient is complaining of pain. Describe the nature and mechanism of injury. Use OPQRST to organize your signs and symptoms. Ensure that you note the severity of the pain for comparison after the initiation of Entonox.
- Note the initial vital signs and the vital signs on arrival at the hospital. Record vital signs taken en route.
- Note any relevant findings of the Physical Examination. Note air entry and abnormal breath sounds.
- Document additional comments on history, vital signs, times and actions during the protocol. You may also discuss pertinent positives and negatives related to the C/C.
- Note and document the following:
  - Time any medication was given
  - Medication, dose, route.
  - Vital signs at the time of administration
  - Result of administration (compare with initial severity of pain before Entonox)

Full Reassessment of Indication for Protocol

Full Reassessment of Indications **PRIOR** to Additional Doses of Medication – Reassess All below					
GCS	Pain Scale				

Go to P.O.M.
- Shortness of Breath

Shortness of Breath Protocol

INDICATIONS

- Chief complaint of shortness of breath in a patient with signs of bronchospasm or bronchoconstriction.[1,3]

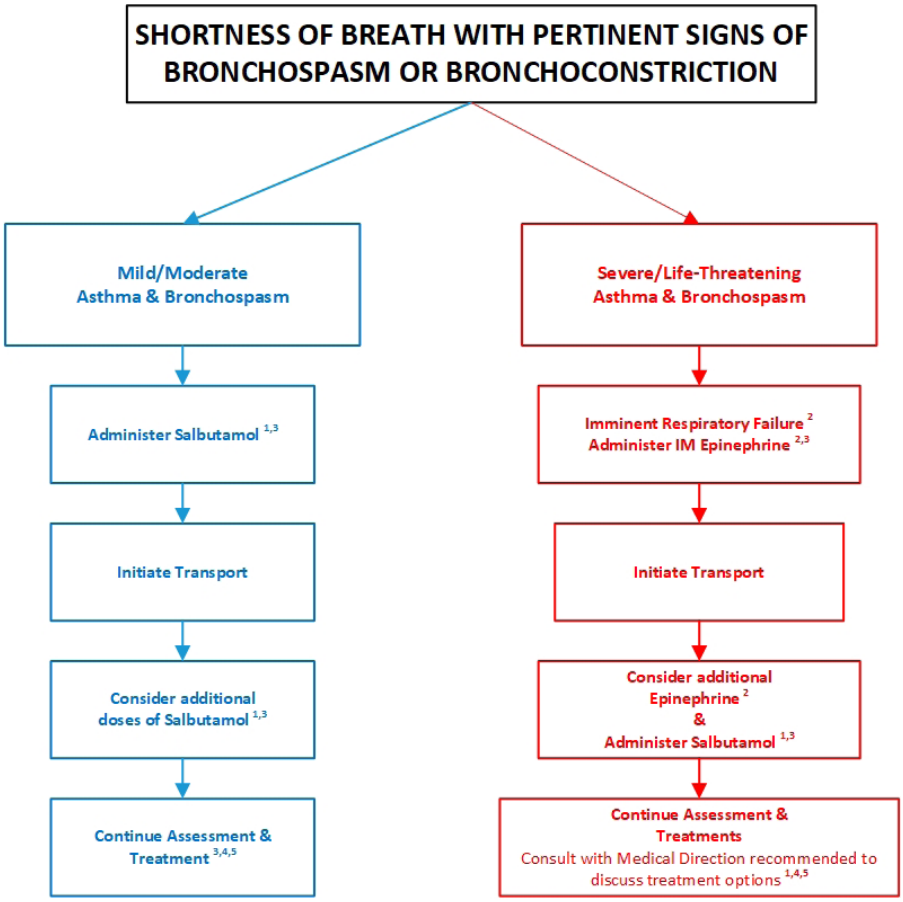
CONTRAINDICATIONS

Refer to *BCEHS Handbook* for drug monographs for:

- Salbutamol (Ventolin)
- Epinephrine

Before initiating the Shortness of Breath Protocol, you must:

- Complete an initial assessment and administer oxygen
- Auscultate lung sounds to confirm bronchospasm or bronchoconstriction
- Obtain critical history including medical history, medications, and allergies
- Obtain baseline vital signs



1. **Consider all causes of shortness of breath, such as: asthma, COPD, congestive heart failure, dysrhythmia, myocardial infarction, pulmonary embolism, and pneumothorax. *Some of these patients may not improve with Ventolin.***
2. **In cases of impending respiratory failure, bronchospasm and/or bronchoconstriction – 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.**
3. Consider all methods of administration for Salbutamol when creating treatment plans using caution to nebulized medication in patients with infectious diseases and/or influenza like symptoms.
4. Continuous positive airway pressure (CPAP) is available as an option to optimize oxygenation in patients who have already received bronchodilator therapy
5. 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. Consultation with Medical Direction is recommended to discuss treatment plan.

Shortness of Breath Protocol Guidelines

Your Shortness of Breath Protocol (SOB) is indicated for patients with shortness of breath ranging from mild bronchospasm and/or bronchoconstriction to respiratory failure from severe bronchospasm.

Definition

The most common respiratory conditions resulting in SOB with bronchospasm and/ or bronchoconstriction are:

Asthma: A condition marked by recurrent attacks of dyspnea with wheezing due to constriction and inflammation of the bronchi.

Emphysema: Destruction of the alveolar wall, eventually resulting in the lungs losing their capacity to recoil and air becomes trapped in the lungs.

Bronchitis: Characterized by the excess production of sputum, eventually decreasing the lung volume available for perfusion.

Goal of Care

The goal of treatment is to correct problems with ventilations, oxygenation, and thereby reverse hypoxia and hypercapnia. The potential treatments include oxygen, ventolin, bag valve mask ventilations (assisted or artificial), CPAP, and/or epinephrine. Any patient who is short of breath should be considered Priority and initiate transport as soon as possible. Patients with mild to moderate bronchospasm may benefit from receiving ventolin prior to transport. Patients with severe or life threatening bronchospasm should have transport initiated as soon as possible.

Guiding Principles

If the patient has improved, you may choose to discontinue Ventolin. The patient must then be placed on supplemental oxygen. The delivery device should be determined with consideration on the patient's medical history and oxygen saturation.

Salbutamol can be delivered by nebulizer or metered dose inhaler (MDI). 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.

Other Considerations

Hypoxic Drive

Respiration is triggered by an increase in the carbon dioxide levels in the blood. Patients with chronic bronchitis or emphysema, live with increased levels of carbon dioxide. They use a back-up system to trigger respiration — a decrease in the level of oxygen in the blood (hypoxic drive). In these patients, an increase in the oxygen levels in the blood may decrease their respiratory drive though current medical literature advises to never withhold oxygen from any patient in respiratory distress. Therefore, in the pre-hospital setting, these patients should be treated with oxygen if they are experiencing respiratory distress.

Oxygen after improvement

If the patient has improved, you may discontinue the protocol. Remember that the patient has been breathing supplemental oxygen since emergency services arrived. You should reduce the amount of supplemental oxygen slowly and continue to monitor the oxygen saturation. If the patient has a history of COPD, then start the patient on low flow (1 – 3 lpm) oxygen by nasal cannula. If the patient has a history of acute asthma, you should place the patient on high-flow oxygen.

Shortness of Breath Protocol Guidelines - continued

If there is no improvement.

Monitor the patient closely. If the patient is deteriorating or does not appear to be improving call medical direction to discuss treatment options. This could include additional doses of Salbutamol, continuous positive airway pressure (CPAP) or in cases where moderate to severe symptoms are not resolving with Salbutamol, intramuscular Epinephrine should be considered.

Life-Threatening Bronchospasm/Bronchoconstriction

Life-threatening bronchospasm/bronchoconstriction is identified as a patient unresponsive to bronchodilators. Respiratory failure is 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.

If the patient is unresponsive to Salbutamol and requires further treatment, this patient must be considered as deteriorating and resuscitative efforts must be prepared.

Further Ventolin may be required along with intramuscular Epinephrine administration.

Full Reassessment of Indication for Protocol

Full Reassessment of Indications **PRIOR** to Additional Doses of Medication – Reassess All below					
Breathing – rate and effort	Auscultate – lungs 6 points	GCS	SPO2 Level	Skin – color, temperature and texture	Patient perception of improvement.

Continuous Positive Airway Pressure (CPAP).

CPAP is a non-invasive means to increases the oxygen diffusion across the alveolar membrane by increasing the functional residual capacity, and increasing alveolar surface area. This can help to decrease a patient's work of breathing, and decrease oxygen consumption, while increasing their oxygen supply. CPAP application has been shown to reduce intubation requirements and mortality.

CPAP should be considered in patients who remain short of breath with low oxygen saturation despite administration of a bronchodilator, or in patients who present with other causes of shortness of breath (CHF, pulmonary edema, near drowning, pneumonia). CPAP can only be used on patients who can comply with instructions, and moving adequate tidal volume. CPAP is not a substitute for ventilations, it is an oxygen delivery mechanism.

Any patient who is unable to maintain their own respiratory effort will not benefit from CPAP. These patients will require assisted ventilation via BVM. It is important to monitor the patient closely for any deterioration as CPAP will no longer be the appropriate therapy for these patients.

Prior to commencing CPAP consultation with Medical Direction is recommended to discuss all treatment options.

Refer to *BCEHS Handbook* for Continuous Positive Airway Pressure procedure.

Suspected Narcotic Overdose Protocol

INDICATIONS

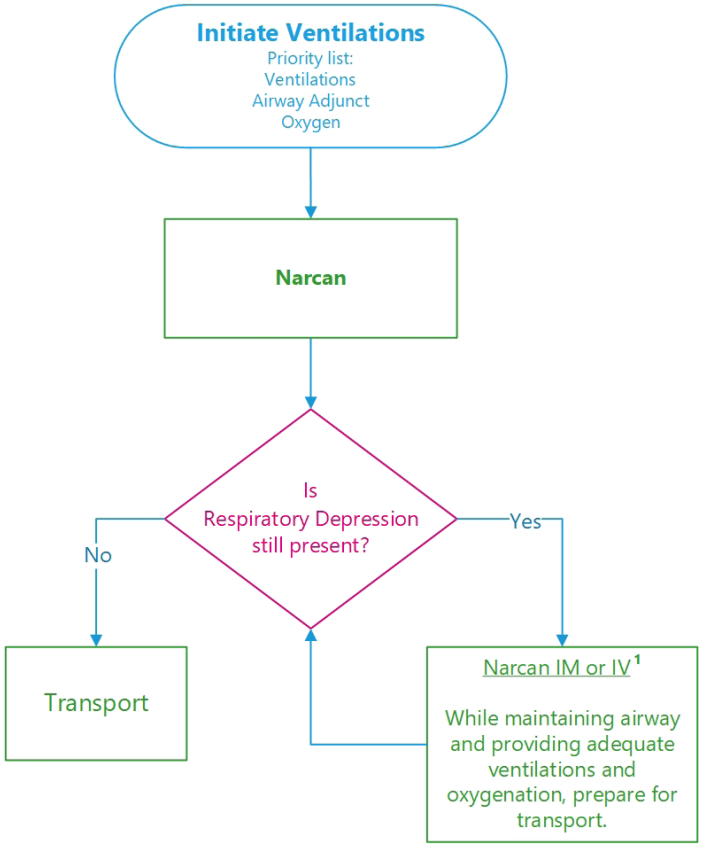
- Altered mental status AND
- Decreased respirations or apnea

CONTRAINDICATIONS

Refer to *BCEHS Handbook* for drug monographs for: Naloxone Hydrochloride (Narcan), Normal Saline (N/S)

Essentials

- Assisted ventilation is the cornerstone of management. Paramedics must ensure that proper airway management, including effective ventilations, continue until symptoms have resolved; this must supersede any pharmaceutical interventions. Monitor oxygenation status at all times.
- Assess for and treat hypoglycemia if present.
- The goal of Naloxone administration is the restoration of adequate respirations – a return of full consciousness is not necessary.
- Paramedics 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



1. Do not administer subsequent doses 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 Medical Direction is recommended in cases where patients do not improve following two doses of Naloxone. Consider titrating to a rate of 0.1mg every 2 minutes IV for palliative patients.

Go to P.O.M.
- Toxicological

Suspected Narcotic Overdose Protocol Guidelines

The Suspected Narcotic Overdose Protocol is indicated for patients with signs suggestive of narcotic overdose. The patient must have a decreased mental status, and respiratory depression.

Definition

Altered mental status is a continuum ranging from mild confusion to deep unconsciousness with absent responses. For a patient who has overdosed on a narcotic, a decreased mental status will likely result from hypercapnia due to hypoventilation.

Goal of Care

The goal of treatment is to reverse life-threatening effects of narcotic overdose with the administration of Naloxone Hydrochloride (Narcan).

Guiding Principles

Improvement in mental status in response to treatment is defined as an increase in the patient's GCS, improvement in the patient's respiratory rate.

It may take time before Narcan starts to work. Before declaring no improvement, ensure at least 3 minutes have passed since the IM injection.

For patients aged 12 or less, higher doses can be given as pediatric patients are unlikely to experience withdrawal. Refer to *BCEHS Handbook* for drug monographs for Narcan dosing.

Intramuscular Narcan is absorbed more slowly than intravenous, providing a smoother emergence of Narcan. Subsequent doses of Narcan can be delivered intramuscularly or intravenously. The route is at the providers discretion.

Patients who have had reversal of symptoms should still be transported to hospital. Narcan has a shorter half-life (60 – 90 minutes) than most narcotics; therefore, a patient must be observed until the narcotic effect has worn off.

Other Considerations

Consider insertion of an extraglottic device for patients with prolonged respiratory compromise, whose respirations do not improve after two treatments.

- Consideration must be given to level of difficulty ventilating the patient, GCS, distance to hospital and achievable oxygen saturation.
- Care must be taken when ventilating the patient (with or without an extraglottic device) to ventilate only enough for chest rise.
- Oxygen saturation goal should be 95% or more.

In the case of a narcotic overdose, it should be remembered that an EGD is a management tool whereas Narcan is a potential reversal agent.

Full Reassessment of Indication for Protocol

Full Reassessment of Indications **PRIOR** to Additional Doses of Medication – Reassess All below				
Breathing – rate and effort	GCS	Skin – color, temperature and texture	SPO2 Level	

Tranexamic Acid (TXA) Protocol

INDICATIONS

- Major trauma patients with ongoing, significant, uncontrolled internal or external hemorrhage[3]; and,
- 12 years of age or older; and,
- Are within 3 hours from time of injury and on route to a receiving hospital with signs of hypo-perfusion

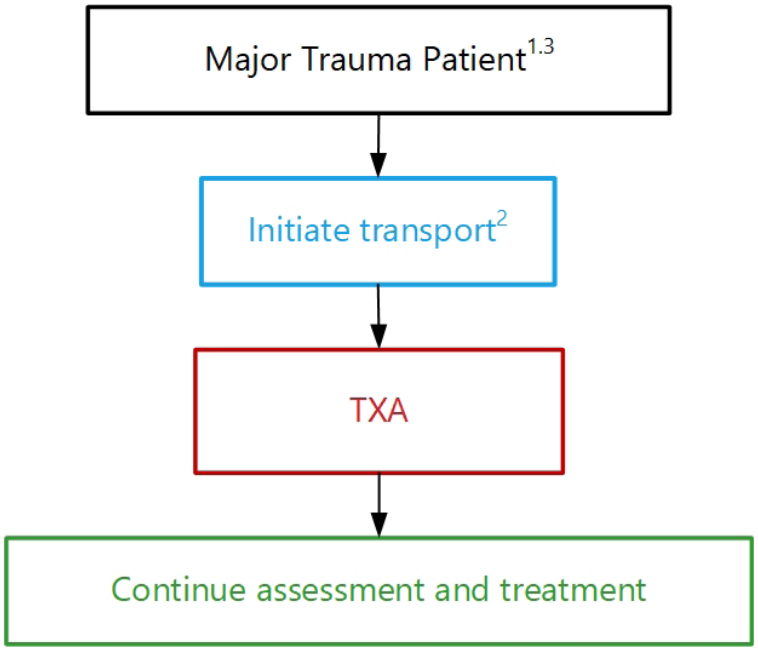
CONTRAINDICATION

Refer to *BCEHS Handbook* for drug monographs for:

- Tranexamic Acid (TXA)

Before initiating the TXA protocol, you must:

- Initiate and manage initial assessment and interventions
- Have initiated the Fluid Resuscitation Protocol



1. Contact Medical Direction for Maternal Vaginal Bleeding (greater than 20 weeks.)
2. Do not delay transport to administer TXA; early surgical intervention is the best and definitive care. Consider TXA on scene in instances where delayed extrication time is present. Best results are when administered within 1 hour from time of injury.
3. TXA is not indicated for isolated TBI's.

Go to P.O.M.
- Obstetrical
- Blunt Abdominal
- Blunt Chest
- Extremity Injuries
- Penetrating Injuries
- Head, Face & Neck

Tranexamic Acid (TXA) Protocol Guidelines

Tranexamic Acid (TXA)

Tranexamic acid is an antifibrinolytic and inhibits fibrinolysis by blocking the lysine-binding sites on plasminogen. Tranexamic acid works to stabilize and inhibit the degradation of existing clots. Tranexamic acid has been prospectively proven to reduce mortality in trauma-related hemorrhage.

Trauma related deaths remain a leading cause of mortality among persons younger than 45 years, and nearly half of these deaths are secondary to hemorrhage (Kauvar & Wade, 2005). Mainstays of trauma resuscitation include surgical interventions aimed at controlling hemorrhage, normalization of circulating blood volumes, and pharmacologic interventions to aid in achieving hemostasis (Henry et al., 2011; Kauvar & Wade, 2005; Vazquez Mata et al., 1996).

MECHANISM OF ACUTE TRAUMA COAGULOPATHY

The coagulation system normally exists in a constant balance of clotting, anticoagulation, and fibrinolysis, or clot degradation. In trauma-related hemorrhage, however, massive and rapid loss of blood volume overwhelms the ability of the coagulation system to maintain a normal homeostasis and shifts this system out of balance.

In the injured trauma patient, uncontrollable blood loss also catalyzes a condition complicated by hypothermia, acidosis, and hemodilution. Hypothermia in an already tenuous patient can induce platelet dysfunction and can impair coagulation enzyme function, largely impacting the initiation of clot formation (Brohi et al., 2007). Hemorrhage and subsequent volume loss create a state of hypoperfusion and thus the body's ability to maintain an adequate oxygen supply to major organs is compromised, therefore, leading to anaerobic metabolism and ultimately metabolic acidosis. A pH that is outside the normal physiologic range can alter the function and capabilities of coagulation enzymes and proteases, contributing to coagulopathy. In addition, hemodilution may ensue if large volumes of crystalloids are infused to the trauma patient during resuscitation, causing a dilution of endogenous clotting factors. That, combined with the consumption of coagulation components and platelets in an attempt to control the hemorrhaging discussed earlier, results in a state of dilution coagulopathy (Kauvar & Wade, 2005; Levy, 2006). Therefore, the therapeutic target for mitigating trauma-related hemorrhage and its subsequent coagulopathy lies in resolving the underlying hemorrhage itself, through either surgical or pharmacotherapeutic means.

Mechanism of Action

Tranexamic acid is part of a class of drugs known as antifibrinolytics.

Tranexamic acid is a synthetic lysine analog that inhibits fibrinolysis by blocking the lysine-binding sites on plasminogen. Rather than being prothrombotic and initiating the formation of new clots, tranexamic acid stabilizes and inhibits the degradation of existing fibrin clots (Cap et al., 2011). This mechanism keeps the patient at minimal risk of a thrombotic event (e.g. venous thromboembolism or pulmonary embolism).

Products and Administration

The formulation evaluated for use in trauma is supplied in vials or ampoules of 1 gram (1,000 mg) in 10 ml of sterile water for injection (Pfizer, 2008). The dose used in the CRASH-2 trial was 1,000 mg infused for more than 10 min, followed by 1,000 mg infused for more than 8 hrs, which closely models regimens used in cardiovascular surgery (Shakur et al., 2010).

Dosing

Refer to *BCEHS Handbook* for drug monographs.

Tranexamic Acid (TXA) Protocol Guidelines - continued

Adverse Effects

There are several adverse events related to tranexamic acid administration that have been reported through the US Food and Drug Administration (FDA). Mild adverse events consist of visual disturbances (17%) including blurry vision and color changes; musculoskeletal events (7%–30%) such as arthralgias, cramps, and back pain; and mild gastrointestinal disturbances (12%–20%) such as nausea, vomiting, and diarrhea. Rarely seen are seizures in the postoperative period following cardiac surgery and hematologic side effects including anemia and thromboembolic events typically seen in the setting of active intravascular clotting (3%–7%;) Kavanagh, Sansom, Harrison, Warwick, & Peachey, 1993; Martin, Wiesner, Breuer, Lange, & Tassani, 2008; Muse et al., 2011; Sander et al., 2010; Wellington & Wagstaff, 2003.

Exposure to the drug through intravenous administration reduces the likelihood for significant adverse events. One clinically significant adverse event that is associated with the intravenous formulation is hypotension and it is attributed to rapid rates of infusion. It is recommended that the infusion of tranexamic acid should not exceed rates faster than 100 mg/min to avoid hypotension (Pfizer, 2008).

CONCLUSION

Pharmacologic agents such as tranexamic acid represent efforts to interrupt or prevent the coagulopathy of trauma and reduce transfusion requirements. Tranexamic acid has been shown to be safe, easy to administer, and has been proven to reduce mortality in trauma-related hemorrhage.

Justice Institute
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Drug Monographs

Refer to the *BCEHS Handbook* for drug monographs.