

PR01: Ambulating Patients

Applicable To

- EMR and higher

Introduction

When it is clinically safe for both the patient and the paramedic, patients should ambulate on their own, or with appropriate support. There are, however, clinical situations in which a stretcher or non-ambulatory method of patient transportation should be utilized. Proper assessment will reduce the risk of patient falls and associated risk of injury to patients and paramedics.

The following criteria can be used as a tool to assist in deciding which patients should be transported via stretcher, or other non-ambulatory method, and which patients can safely self-ambulate.

Although these guidelines are meant to provide you with support in the decision about what to do and how to do it, there can be extenuating or unforeseen issues that complicate circumstances. If you are in a situation in which are unsure about the correct course of action, please pause, reflect for a moment, and consider the BCEHS Ethics Framework; specifically, the use of the JAY Tool (page 12), for in-the-moment decision-making. The JAY Tool can help individuals to consider all the factors involved, before they make a final decision about what to do.

Procedure

Steps to applying the BCEHS Patient Movement Assessment Tool

The paramedic may consider some or all of these points when applying the BCEHS Patient Movement Assessment Tool:

STEP 1: Nature of the Complaint/General Impression

- Differential Diagnosis (consider Mechanism of Injury)
 - When the differential diagnosis indicates one of the following, these patients warrant a stretcher:
 - Cardiac in nature
 - Severe Respiratory with clinical indicators (e.g. shortness of breath with audible wheezes decreased O2 saturations)
 - Life/Limb Threatening MSI
 - Considerations – these considerations may warrant a stretcher or be mitigated by other assistive devices:
- 1. *Consider the patient's acuity:*
 - "Sick or Not Sick"
 - Mentation – is the patient able to follow a conversation/is the patient cooperative/is eye movement consistent with intentional cooperation/age of patient
 - Are they medically able to walk?
 - Are there underlying medical conditions that may be exacerbated?
 - Is the patient in pain, and will walking the patient make the pain worse?
- 2. *Consider the risks:*
 - Risk to the patient, stable gait, do they normally use a walker?
 - Risk to the paramedic, size of the patient, potential for violence or contamination?
 - Risk to the public?

STEP 2: Patient Assessment

- Complete as much as possible prior to movement to help confirm or deny your thoughts formulated during Step 1 – using best judgement:
 - Complete Vital Signs (are they normal for THIS patient?)
 - Assessment of Mentation: GCS and/or LOC x3 (Person, Place, Time) to help determine suitability of ambulation
 - History
 - Functional Inquiry

- Physical Examination

STEP 3: Patient Conversation

- A discussion with the patient about the treatment plan allowing them to be part of the decision making process
- Reminder: In this situation the distance to the stretcher is taken into consideration based on the acuity of the patient
- Ethics Framework (JAY tool)
 - Depending on the situation paramedics may need to use this tool

STEP 4: Walk, Minimal Assist, Stretcher

- Walk – self ambulate with or without an aid
- Minimal Assist
 - PHSA Safe Patient Handling Standard and FAQ
 - If it is assumed the patient will need more than Minimal Assistance, it is recommended the patient be moved using a non-ambulatory method
 - See the [Staged Approach Standard Operating Procedure](#).

STEP 5: At the Receiving Facility, a reassessment may occur as the patient's condition and abilities may have changed.

Notes

Staged Approach to Safe Patient Movement

- **Safe Patient Handling standard:** Please note that this assessment tool works in accordance with the PHSA Safe Patient Handling Standard which states that patients should not be manually lifted if it can be avoided and is not detrimental to the patient's health. Please review the [standard](#) and associated [FAQ](#).
- Manually lifting a patient who can safely walk is not a desirable option. However, a high risk of injury to patient and paramedic is associated with ambulating a patient at risk of falling. Proper assessment is critical in reducing risk of falls.
- Do not rely on the patient's spoken communication to determine if it is safe for them to ambulate. Upon completion of your assessment (as outlined in the Patient Movement Assessment Tool), proceed to assess the patient's ability to move. From the patient's starting position, use the Staged Approach to Safe Patient Movement to guide your decision-making on how to move the patient; this assessment stops when the patient is not able to move onto the next level with no more than minimal assistance. At this point, stop and consider a stretcher or assistive device.

Patient Assessment:

- **Before ambulating a patient, be sure the patient:**
 - Has passed the **Patient Movement Assessment Tool** and no contraindications are indicated
 - Is cooperative, alert and able to follow directions
 - Can move from lying to sitting and balance while sitting independently or with minimal assistance
 - Can stand up and balance independently or with minimal assistance
 - Can step in place while maintaining balance independently or with minimal assistance
 - Has the ability to self-transfer the distance required (do not over-estimate the patient's capabilities)
- **Important points:**
 - Clear the environment – ensure no tripping hazards
 - Ensure mobility aids, if used, are within reach – on their strong side if possible
 - Ensure patient is wearing non-slip footwear if available
 - *Do not attempt to catch a falling patient! Try to control the direction of the fall and protect the patient's head*

Procedure for Staged Approach:

Assist patient from lying to sitting. If patient can't do this independently or with minimal assist, don't walk the patient.

With patient sitting up:

- Check that patient's feet are flat on the floor, and knees and hips are approximately 90 degrees (sitting surface should not be too low), with feet behind knees
- Have patient move to the edge of sitting surface
- Cue patient for proper hand placement (e.g. push on mattress or chair armrests)

Stand to the side of the patient, support the patient at the back (option to hold patient's belt if present to stabilize). Use a walker or other mobility device if this is standard practice for the patient.

Assist patient to standing position by reminding patient to have "nose over toes" and to lean into standing (cue patient to push down to get up). The paramedic should direct the movement and may provide minimal assistance by supporting the patient under their belt, elbow or wrist. The patient should not grasp the paramedic and should not be in a position to pull the paramedic down at the shoulders should they fall.

Ensure patient is able to maintain balance in standing position. If balance is questionable, sit the patient back down and re-evaluate or proceed with non-ambulatory methods of transfer.

Once the patient is clearly maintaining balance in standing, check that the patient is able to step on the spot, while continuing to maintain balance prior to ambulating, using mobility aid as applicable. If balance is questionable while stepping, sit the patient back down and re-evaluate or proceed with non-ambulatory methods of transfer.

If patient can step in place, and you feel safe to proceed, assist patient (by guiding and or cuing) to ambulate to destination, holding belt if necessary. If walking in hallway, stay close to the wall)

Once the patient has completed their trip, ensure seating surface is positioned squarely behind the patient's knees, locked and adjusted to an appropriate height when possible, and then instruct patient to sit down.

- Provide verbal reminder to patient: "Can you feel the seat behind your knees?"
- Verbally cue patient to reach behind to help guide and support themselves while lowering: "Reach behind yourself with one hand to the seat to help let yourself down."
- Minimally assist patient as needed to appropriate sitting/lying position.

References

BCEHS. Ethics Framework. 2017. [\[Link\]](#)

Provincial Health Services Agency. Workplace Health - Safe Patient Handling. [\[Link\]](#)

PR02: Pelvic Binders

Applicable To

- EMR and higher

Introduction

If a pelvic injury is suspected, or there is a high mechanism of injury in an unconscious patient, the pelvis should be bound with a T-POD or KED. Binding the pelvis reduces overall pelvic volume, creating a tamponade effect, stabilizes fracture fragments reducing bleeding from the fracture sites, and improves patient comfort.

Pelvic binders should not be used for isolated neck-of-femur or hip fractures.

Indications

Major mechanism suggestive of pelvic fracture with **any** of the following:

- Hemodynamic instability (heart rate > 100 or systolic blood pressure < 90 mmHg)
- Pelvic pain on exam
- Pelvic instability
- Decreased level of consciousness
- Major injury distracting from pelvic exam.

Contraindications

- Hip fractures
- Falls from standing height or other simple falls

Procedure

1. Remove the patient's clothing. The T-POD should be in direct contact with the skin.
2. Slide the belt under the supine patient and into position under the pelvis, with the center of the belt aligned with the greater trochanter
3. Trim the belt, leaving a 6 to 8 inch gap over the center of the pubic symphysis
4. Apply the Velcro tension straps
5. Slowly draw tension creating simultaneous, circumferential compression
6. Record the date and time of application
7. Secure the belts to ensure constant pressure without accidental release
8. If release is required, or occurs accidentally, the time of this event should also be noted
9. Document the application of the T-POD in Siren in Major Trauma: Intervention: Circulation

Notes

Insert TPOD Photo of iliac crest alignment here.

Resources

References

Pyng Medical. T-PODResponder Training Instructions & Materials. [[Link](#)]

PR03: Tourniquets

Applicable To

- EMR and higher

Introduction

Tourniquets are indicated for severe bleeding from trauma to extremities where other methods of bleeding control have proven ineffective. Most bleeding can be controlled through direct pressure, elevation, and immobilization, but occasionally injuries can be significant enough to require tourniquet use.

Indications

Bleeding from an extremity that cannot be controlled through direct pressure or wound packing.

Procedure

1. Identify uncontrolled external bleeding
2. Make one attempt at control with direct pressure
3. If unable to control bleeding with direct pressure, and the wound is on an extremity: position the tourniquet 2 – 5 cm above the injury, or as high on the limb as possible. Do not apply over joints. Remove clothing and ensure tourniquet is in direct contact with skin.
4. Secure tourniquet strap through the buckle, pull the strap until it is snug, and apply tension using the windlass until all bleeding has stopped. Lock the windlass into position and secure using the strap.
5. Note the time of application. Document the procedure in Siren.
6. Consider providing analgesia to the patient in accordance with [CPG E08](#)

Resources

PR04: Wound Packing

Introduction

Wound packing is a form of direct pressure that places gauze material directly on the lacerated blood vessels in an attempt to control bleeding.

Indications

Wound packing is indicated for penetrating wounds where bleeding cannot be controlled using direct pressure alone. It is an ideal technique for injuries to junctional areas of the body, including the groin and axilla, where tourniquets are ineffective and direct pressure can be difficult to maintain.

Contraindications

Do not pack wounds on the neck, chest, or abdomen. There is a risk of airway compromise when packing neck wounds. Wound packing is unlikely to be effective on the chest or in the abdomen due to the nature of these injuries.

Procedure

1. Ensure appropriate protective equipment is used, including eye protection or face shields.
2. Obtain and open multiple packages of gauze. Sponges may be used if roll gauze is not available.
3. Insert fingers into the wound to provide direct pressure on the target blood vessels; ideally, the artery or vein (or both) should be compressed against a bone while packing material is being readied.
4. Pack the wound tightly with gauze. Continue applying pressure during the packing process, alternating fingers if necessary. Ensure the packing material reaches as deeply into the wound cavity as possible.
5. When the wound cannot accommodate any more packing material, apply very firm direct pressure to the wound and its packing material for at least three minutes to allow the clotting process to begin. If bleeding continues, consider packing more material into the wound.
6. Secure the wound packing with a pressure dressing and transport immediately (if not already en route). Immobilization of the injury may help to limit re-bleeding.

Resources

References

Insert stop the bleed material from Learning when it finally has a home on a publicly visible page

PR05: Patient Decontamination

Applicable To

- EMR and higher

Introduction

Patient decontamination is any process, method, or action that leads to a reduction, removal, or neutralization by partitioning, binding, or inactivation of contamination on, or in, the patient. It is intended to prevent or mitigate adverse health effects to the patient, to protect emergency first responders, health care facility first receivers, and other patients from secondary contamination, to facilitate faster access to medical care, and to reduce the potential for secondary contamination of response and health care infrastructure.

When required, decontamination is a specific medical countermeasure to toxic or chemical exposures. It should be considered a first aid measure, and can be explained to patients as such.

Scene Management

It is critically important to control the environment of a hazardous materials incident. Isolate the scene, and deny access to the public, media, and unnecessary responders to prevent needless contamination. Hazardous materials scenes have three concentric control zones:

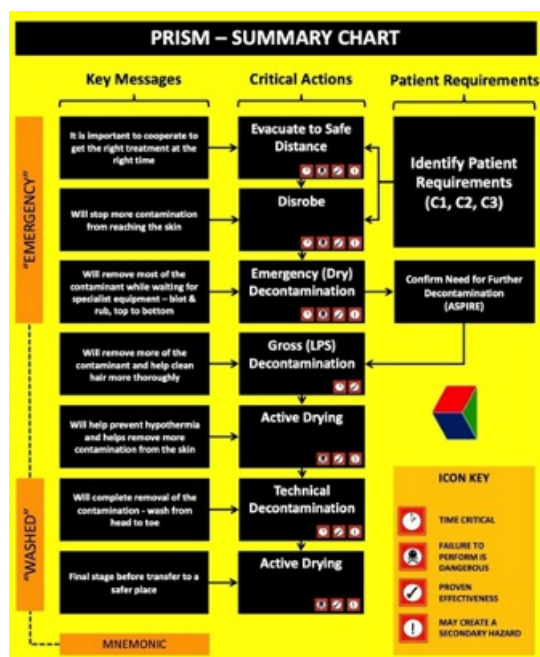
- The **hot zone**, or red zone, is an exclusion or restricted area. Chemical protective equipment is required.
- The **warm zone**, or yellow zone, is an area for decontamination or contamination reduction. Chemical protective equipment is required here, too.
- The **cold zone**, or green zone, is a support zone and is the location in which BCEHS will conduct assessment and treatment. No chemical protective equipment is required in this zone.

 **ALL PARAMEDICS MUST CONTACT CLINICALL (1-833-829-4099) TO SPEAK WITH PARAMEDIC SPECIALISTS PRIOR TO ASSESSING PATIENTS FROM A HAZARDOUS MATERIALS INCIDENT OR CHEMICAL EXPOSURE. BCEHS DOES NOT PROVIDE EQUIPMENT TO PROTECT AGAINST EXPOSURES, OR TO WORK IN HOT OR WARM ZONES.**

It is vitally important that BCEHS paramedics work collaboratively with other agencies at the scene to manage hazardous materials incidents and perform appropriate decontamination.

Procedure

- Evacuate patients to a safe distance prior to decontaminating. Segregate individuals by sex whenever possible.
- Have patients remove all clothing and jewellery prior to performing an emergency (dry) decontamination: this is the most important step, and may remove 80-90% of contaminants.
- When conducting a wet decontamination, wash with water and mild soap. Pay close attention to exposed skin folds, axillae, genitals, and feet. Use warm water to reduce the risk of hypothermia, and work systematically from head to toe.
- The optimal water rinse time is 15 minutes per person. In cases with large numbers of contaminated patients, a 3 minute water rinse irrigation is permissible to prevent secondary contamination and downstream contamination of health care providers.
- All removed clothing items are considered hazardous, and must be properly collected, double bagged, and marked as such for disposal.
- A majority of patients involved in a chemical exposure will not stay at the scene, and will find alternative transport to hospitals. Surrounding health care facilities should be notified as soon as possible of the potential arrival of contaminated patients to limit contamination of their staff and departments.



The Three Pillars of the Primary Operational Response (POR)

Adapted from "Decontamination Guidance for Chemical Incidents," medicalcountermeasures.gov

The overriding objectives of the POR are to maximize initial survivability and minimize long term sequelae in individuals who have been accidentally or deliberately exposed to toxic chemicals. The three "pillars" that support these objectives are an understanding of individual needs (patient requirements), an effective communication/management strategy and clinically effective patient-focused actions.

Patient Requirements

A proportion of patients may be unable to comply with instructions issued by emergency responders. For example, they may be unresponsive, have life-threatening injuries or may not be able to understand instructions or perform activities without accommodations or assistance. In order to maintain operational effectiveness, all patients need to be rapidly categorized to ensure they are on the appropriate treatment pathway. This guidance document defines three patient categories (C1, C2 and C3)

Definition of patient categories.

- C1: Patients who are able to understand instructions and perform activities without assistance.
- C2: Patients who are either unable to understand instructions, or who are unable to perform activities without accommodations or assistance.
- C3: Patients who are unresponsive, have life-threatening injuries or require extensive accommodations or assistance.

Assistance with this form of triage is available from the ASPIRE tool, available from the National Library of Medicine's CHEMM website.

Communication and Patient Management

Good communication is key to acquiring the trust and cooperation of patients, and will maximize the overall efficiency of the initial response phase. Failure to adequately interact with patients may lead to unnecessary anxiety, non-compliance and security issues at the scene of an incident.

Patient-Focused Action

The goal of the POR is to save lives and improve the clinical outcome of chemically contaminated patients. It is imperative that the following four actions are performed as soon as practically possible:

- Evacuation: Immediate, orderly movement upwind from hazardous areas is a key component of the initial operational response. Inappropriate or delayed evacuation may exacerbate the clinical effects of exposure to hazardous materials and will hamper the effectiveness of subsequent operations.
- Disrobe: The critical, urgent need to safely remove contaminated clothing cannot be overemphasized and is a

process that requires effective communication to facilitate patient compliance. The golden rule is that no form of decontamination should be undertaken before disrobing.

- Decontamination: While disrobing will remove the vast majority of a contaminant, exposed areas will require decontamination to remove hazardous material from the hair and skin. There are three forms of decontamination: emergency, gross and technical.
 - Emergency decontamination is the phrase used to emphasize the time-critical process for the immediate removal of hair or skin contamination by any available means and can be divided into “dry” and “wet”.
 - Emergency dry decontamination is the default option and should be performed with any available absorbent material.
 - Emergency wet decontamination should only be used when the contaminant is caustic (e.g., provokes immediate skin irritation) or is particulate in nature and should be performed using any immediately available source of water at an appropriate temperature (i.e. not exceeding 40° C or 104° F).
 - Gross decontamination includes the “Ladder Pipe System”, where two fire engines are parallel parked to form a corridor through which patients pass while being sprayed with a high volume of low-pressure water mist. Alternatively, patients can be sprayed directly with hosepipes using a fogging nozzle.
 - Technical decontamination requires the use of specialist decontamination units and associated resources that need to be transported and subsequently deployed at the scene of an incident. In some jurisdictions, technical decontamination is performed at a hospital and so requires transport of patients from the scene of the incident. Either way, there will be a delay before technical decontamination can be performed.

Early emergency and gross decontamination compensates for the delayed availability of technical decontamination. It should be noted that the clinical benefits of emergency, gross and technical decontamination are synergistic: such a “triple protocol” is most effective when performed as one continuous process.

- Active Drying: The act of drying the skin after any form of wet decontamination is a key step. This simple but effective process assists in removal of contaminants from the hair and skin surfaces and thus prevent further spread of contamination

References

1. US Department of Health & Human Services. MedicalCountermeasures.gov. [\[Link\]](#)
2. US Department of Health & Human Services. Patient Decontamination in a Mass Chemical Exposure Incident: National Planning Guidance for Communities. 2014. [\[Link\]](#)
3. US Department of Health & Human Services. PRISM: Primary Response Incident Scene Management. [\[Link\]](#)

PR06: High Performance CPR

Applicable To

- EMR and higher

Introduction

The 2015 CPR Guidelines emphasized the importance of providing high quality CPR. The quality and timing of CPR is critical to successful resuscitation in patients who have experienced a sudden cardiac arrest. High performance CPR should be used in all cases of cardiac arrest from a presumed cardiac cause (i.e., not in traumatic arrests).

Procedure

1. Paramedics should adhere to the five principles of high quality CPR by focusing on providing:
 1. Compressions at optimal rates: 100 to 120 compressions per minute
 2. Compressions at an optimal depth of 2" or 5 cm
 3. Complete chest recoil during compressions: after each compression, a negative pressure develops in the chest that pulls blood into the thorax for the next compression. (This is also when coronary arteries are perfused.). Maintaining pressure on the chest wall that results in incomplete chest recoil diminishes or prevents the return of blood into the thorax.
 4. Ventilation at optimal rates: 1 breath every 6 seconds. Paramedics should also be aware of volumes when ventilating; in adult patients, no more than 500-600 mL should be given during CPR.
 5. Minimally interrupted compressions. Pauses during compressions should be limited to 10 seconds or less. Perform pulse checks only while analyzing rhythms, or if signs of spontaneous circulation become evident.
2. When charging monitors and defibrillators prior to delivering shocks:
 1. For AEDs: pause compressions only as long as required to conduct the analysis. Immediately resume compressions once the AED has completed the analysis, even if a shockable rhythm is detected.
 2. With compressions ongoing, verify the presence of a central pulse
 3. Charge the defibrillator (or allow the AED to charge)
 4. Once the defibrillator is charged, stop compressions. Confirm the absence of central pulses.
 5. Clear the patient and deliver the shock
 6. Immediately resume compressions *without* checking for pulses
3. Clear delegation of roles and effective intra-team communication and leadership are fundamental to success in resuscitation efforts

Resources

PR07: Nasopharyngeal Airway

Applicable To

- EMR and higher

Introduction

Nasopharyngeal airways can provide significant airway protection for patients whose level of consciousness is decreased, but who maintain some airway reflexes, and for whom oropharyngeal airways would prompt gagging or vomiting. They are also useful for patients who are trismic, or who have injuries to their mouth or jaw.

Indications

Nasopharyngeal airways are indicated in the management of patients who require an airway adjunct, but who are unable to tolerate an oropharyngeal airway, or where an oropharyngeal airway is unable to be placed.

Contraindications

- Significant maxillofacial trauma, particularly Le Fort fractures of the zygoma.

Procedure

1. Select an appropriate size of nasopharyngeal airway by measuring a candidate airway against the patient's face: measure the distance from the nostril to the tragus of the ear, holding the nasopharyngeal airway in its neutral position. Do not straighten the airway to measure it.
2. Lubricate the barrel of the nasopharyngeal airway. Avoid getting lubricant in the lumen.
3. Unless anatomy or injury dictates otherwise, select the largest nostril on the patient and insert the nasopharyngeal airway perpendicularly to the plane of the face. Advance the airway straight back with a gentle but firm motion. Some rotation may be necessary to overcome obstacles in the turbinate. Do not use force to overcome resistance.
4. A jaw thrust is needed to ensure the epiglottis lifts off the laryngeal inlet.

Notes

- Bleeding is the most common complication of nasopharyngeal airway placement. This risk is higher in individuals who are taking anticoagulant medications. If bleeding develops, leave the nasopharyngeal airway in place so long as it does not cause airway obstruction or compromise; otherwise, remove the airway and place the patient in a protective position.
- PCPs may not suction down the lumen of the nasopharyngeal airway.

Resources

PR08: Supraglottic Airway

Applicable To

- PCP and higher
- PCP requires completion of AIME BLS II **and** CPD 2019 for use outside of cardiac arrest

Introduction

The iGel supraglottic airway device is a tool used to provide a higher degree of airway protection that can be obtained through the use of a pharyngeal airway. It transfers the working interface between the bag-valve mask from the face to the laryngeal inlet. Paramedics may use supraglottic devices in the setting of cardiac arrest, or in patients who are obtunded and breathing spontaneously.

Indications

Supraglottic airway devices may be placed in patients who are unable to protect their airways due to a decreased level of consciousness.

Primary care paramedics who have not completed AIME BLS II and CPD 2019 may only use supraglottic airway devices in cardiac arrest.

Contraindications

- Inability to place device due to difficulties with mouth opening
- Known or suspected pathological or foreign-body airway obstruction
- Trauma to the trachea, neck or oropharynx
- Caustic ingestion
- Active vomiting
- Relative: Anticipated requirement for high inspiratory pressures during ventilation

Procedure

1. Select an appropriately-sized supraglottic airway and remove it from its packaging and its cradle. EGD sizing is based on patient weight.
2. Place lubricant on the cradle. Lubricate the supraglottic airway on all sides, taking care to avoid the lumen.
3. Open the patient's mouth and introduce the soft tip towards the hard palette
4. Allow the supraglottic airway to glide along the hard palette and advance the device until resistance is felt.
5. Confirm placement by ventilating using a bag-valve mask
6. Secure the supraglottic airway using tape or a commercial tube holder

If it becomes necessary to remove a supraglottic device:

1. Where possible, raise the patient to a semi-recumbent position (30°)
2. Prepare suction, bag-valve mask, and oxygen delivery devices
3. Cut or remove ties or tube holders
4. Ask the patient to take a deep breath, and then blow out firmly. While the patient is blowing out, pull the airway smoothly out of the mouth.
5. Suction the oropharynx as needed.
6. Monitor oxygen saturation.
7. Support respirations as needed.

Notes

- Airway obstructions are an absolute contraindication to use of a supraglottic airway. Paramedics **must**, therefore, confirm they are able to ventilate the patient with a bag-valve mask prior to placing a supraglottic airway.
- The supraglottic airway is a tool to solve problems relating to oxygenation and ventilation. Paramedics should apply a staged approach to airway problem solving prior to using a supraglottic airway.
- PCPs may not suction down either lumen of a supraglottic device
- Do not occlude the suction port of the supraglottic airway

Resources

PR09: Continuous Positive Airway Pressure

Applicable To

- PCP and higher
- PCP requires CliniCall consultation prior to use of continuous positive airway pressure

Introduction

Continuous positive airway pressure (CPAP) devices provide a non-invasive method of improving oxygenation in patients who are experiencing significant respiratory distress. The use of CPAP eases work of breathing, supports alveolar recruitment, decreases overall mortality, and reduces the need for intubation.

Indications

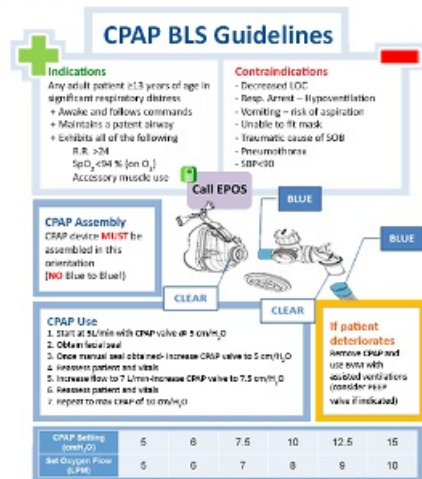
Patients who are:

- Awake and able to follow commands
- Able to maintain an open airway
- Over 13 years of age
- Exhibiting respiratory distress with **all** of the following:
 - Respiratory rate > 24/minute
 - SpO₂ < 94% on supplemental oxygen
 - Use of accessory muscles
- Consider the use of CPAP in adult patients with respiratory distress, including but not limited to:
 - Congestive heart failure or acute cardiogenic pulmonary edema
 - Asthma
 - Submersion injuries
 - Pneumonia
 - Chronic obstructive pulmonary disease

Contraindications

- Patients less than 13 years old
- Decreased level of consciousness, or inability to follow commands
- Respiratory arrest or hypoventilation
 - Patients who are in imminent or actual respiratory failure (i.e., whose respirations are slow, feature shallow tidal volumes, and whose level of consciousness is falling) are not candidates for CPAP. These patients *must* be ventilated with a bag-valve mask (and may benefit from PEEP use).
- Unable to fit mask to patient's face
- Vomiting or any other risk of aspiration
- Traumatic cause of respiratory distress
- Tracheostomy
- Suspected or known pneumothorax
- Systolic blood pressure < 90 mmHg

Procedure



PRIMARY CARE PARAMEDICS MUST CONSULT WITH CLINICALL (1-833-829-4099) PRIOR TO STARTING CPAP THERAPY

1. Assemble appropriate equipment. Verify mask sizing by comparing the mask to the patient's face.
2. Explain the procedure and obtain consent.
3. Position the patient in an upright, sitting position. Attach pulse oximeter.
4. Connect the CPAP mask to the oxygen source. Set the flow to 5 LPM if possible (otherwise use 6 LPM).
5. Have the patient hold the CPAP mask over their nose and mouth. A progressive application of pressure to obtain a seal may be required to maximize the acceptance of the mask. Paramedics should be calm and reassuring.
6. Once the patient appears to be able to tolerate the mask, position the bonnet over the back of the head and attach the straps to the side of the mask. Adjust the Velcro and headpiece for optimal seal.
7. Examine the mask seal for leaks. Reassess the patient.
8. If SpO₂ remains below 92%, follow the manufacturer's flow rate chart. Incrementally raise the oxygen flow to increase both FiO₂ and CPAP pressure. Do not exceed 10 cmH₂O.

Notes

- Do not attempt to use the CPAP mask for bag-valve ventilations.
- Oxygen saturations may transiently fall during initial CPAP use. Allow time for the mask to work before adjusting the therapy.
- Do not delay the administration of medications to apply a CPAP mask.
- Use conventional therapies (e.g., bronchodilators) first in patients with audible wheezing. Nebulizers, connected to the mask with a T-piece, may be attached to the auxiliary port on the CPAP mask; in this case, increase the oxygen flow rate by 7-8 LPM.
- A do-not-resuscitate order or MOST does not preclude the use of CPAP for relief from shortness of breath.

Resources

References

1. BLS Systems. Rescuer II Compact CPAP System. [\[Link\]](#)

PR10: Positive End Expiratory Pressure

Applicable To

- PCP and higher

Introduction

The addition of Positive End-Expiratory Pressure Valve (PEEP) to a bag-valve mask is a non-invasive means of increasing oxygenation in patients who are in significant respiratory distress or respiratory arrest where assisted ventilations are not able to maintain oxygen saturation. It maintains air pressure in the alveoli, "splinting" them open to increase the surface area involved in gas exchange.

Indications

The use of a PEEP valve should be considered in patients who remain hypoxemic ($SpO_2 < 90\%$) despite good bag-valve masks ventilation techniques and airway management. It can be combined with high-flow nasal cannula oxygenation to maximize oxygen delivery to the body.

Contraindications

- Patients in cardiac arrest
- Systolic blood pressure ≤ 90 mmHg
- Known or suspected pneumothorax
- Traumatic cause of respiratory arrest

Procedure

1. Attach the PEEP valve to the exhaust port on the bag-valve mask
2. Set the dial on the PEEP valve to 5 cmH₂O
3. Establish and maintain a good mask seal. Begin ventilating at an appropriate rate, usually no more than 8-10 breaths per minute.
4. Monitor oxygen saturation and blood pressure for changes
5. PEEP may be increased in increments of 2.5 cmH₂O to a maximum of 10 cmH₂O. Consult with CliniCall if patients remain hypoxemic despite maximal oxygen therapy.
6. Continue with medications as appropriate to correct cause of respiratory distress or arrest

Notes

- To be effective, PEEP requires a complete mask seal (the "closed circuit"). Removing the mask from the patient's face will release the end-expiratory pressure and allow alveoli to collapse. For critically ill patients, paramedics should seek to minimize the amount of time the mask is not firmly sealed to the patient's face.
- Discontinue PEEP if any of the following occur:
 - The patient's systolic blood pressure drops below 90 mmHg
 - Any contraindication arises
 - Equipment failure or concerns

PR11: Intranasal Medication Administration

Applicable To

- PCP and higher

Introduction

Some medications in the BCEHS pharmacopeia can be administered intranasally. This is a relatively rapid route of delivery that can offer significant safety benefits over parenteral drug administration, and may be preferred in some circumstances.

Procedure

1. Using a blunt 3 mL syringe, draw up half the dose of medication. Note that the atomizer contains 0.1 mL of dead space: having calculated the volume of medication required for a given dose, draw an additional 0.1 mL into the syringe.
2. Remove the blunt or fill tip, and attach the mucosal atomizer device to the syringe.
3. Verify that the nostrils are not obstructed by blood or mucous.
4. If the patient is sitting upright, tilt the patient's head back slightly. Otherwise, position the patient supine.
5. Dispense the volume into each nostril; this allows for more effective absorption. The maximum volume per nostril is 1 mL; if higher volumes are required, consider alternative routes of administration.
6. Repeat procedures 1-5 for the second half of the medication dose. (Drawing up half the dose of medication and administering twice ensures that the medication is delivered at the appropriate speed for proper atomization)

Resources

PR12: Intraosseous Cannulation

Applicable To

- ACP and higher

Introduction

Intraosseous cannulation is available as an option for paramedics requiring vascular access when peripheral attempts have failed.

Indications

- Two unsuccessful peripheral IV attempts, or an inability to visualize peripheral veins (including external jugular vein)
- Unstable patient requiring medications or fluid replacement

Contraindications

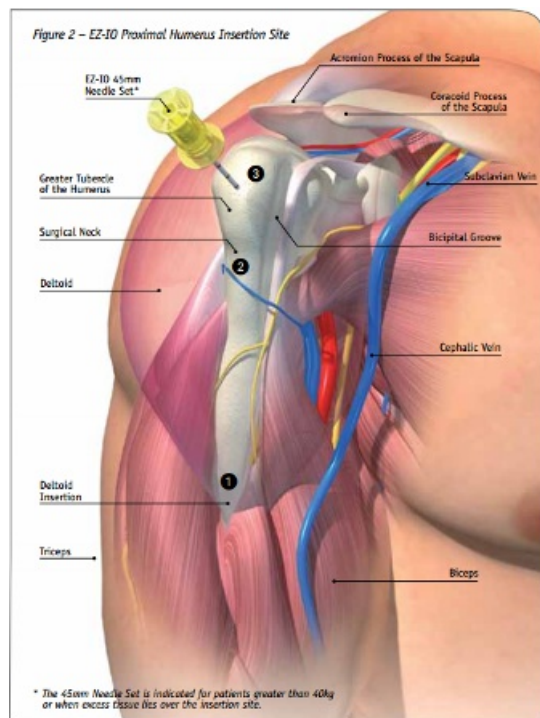
- Skeletal or tissue damage in the extremity to be used
- Prior proximal tibial surgery or knee joint replacement
- Signs of infection around the site

Procedure

1. Assemble equipment, including EZ-IO driver, needle, primed EZ-Connect extension, infusion fluid and line set, and 20 mL syringe of normal saline.
2. Select the site of needle insertion and clean the skin.
3. Using aseptic techniques, drive the needle into the bone. Press gently: let the drill do most of the work.
4. Remove the stylet, and secure the sharp. Place the stabilizer dressing over the needle hub.
5. Connect a primed EZ-Connect extension.
6. Aspirate for the presence of bone marrow or blood to confirm the placement. If patent, connect the IV tubing to the extension set. If unsuccessful, change to another site on a different limb. Do not reuse the same limb.
7. In patients who are conscious, give lidocaine, 40 mg (0.5 mg/kg in children to a maximum of 40 mg) through the extension for local anesthesia.
 - Instill the lidocaine slowly, over 120 seconds, and allow it to dwell in the bone marrow cavity for 60 seconds.
 - Attach the lidocaine syringe directly to the intraosseous hub; do not attach to the IV line or extension set to ensure accurate drug delivery and avoid dosing errors.
8. Slowly flush the IO catheter with 5-10 mL normal saline (2-5 mL in children).
9. Slowly infuse *half* of the initial dose over 60 seconds.
10. Connect the 20 mL syringe to the proximal access port on the IV tubing. Flush the line and the extension set, pushing *firmly* and *briskly* on the syringe plunger.
11. Set the appropriate flow rate. Pressure infusers or intermittent boluses may be required.
12. Protect the site and monitor for signs of extravasation.

Notes

- Needle placement in the proximal humerus has been demonstrated to have significantly improved infusion rates compared to the tibial plateau. It should be considered as the preferred IO site in patients. If using the humerus, choose the larger (yellow) needles. To review anatomy and landmarks, see video below.



- Paramedics should review [this educational material](#) for additional information about intraosseous site selection. Contact a Paramedic Practice Educator for specific questions or concerns.

Resources

PR13: External Jugular Cannulation

Applicable To

■ ACP and higher

Introduction

External jugular cannulation is a vascular access option that allows for relatively large bore devices and the delivery of larger volumes of fluid than might otherwise be possible through a peripheral vein.

Indications

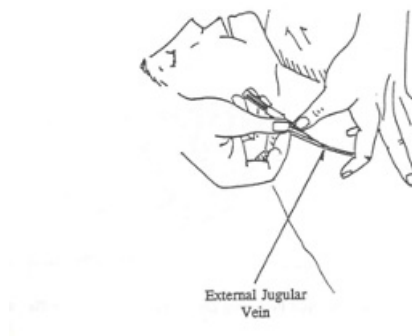
A need for vascular access where peripheral access is not possible, and intraosseous access is unavailable.

Contraindications

No absolute contraindications. This can be a time-consuming procedure; if speed is a requirement, consider [PR12: Intraosseous Cannulation](#).

Procedure

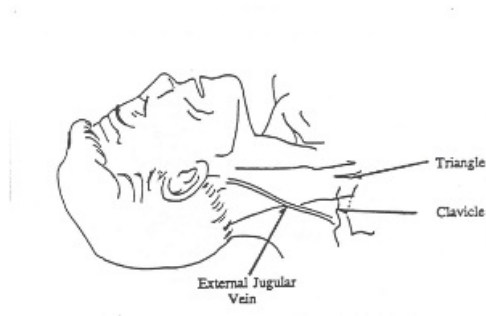
1. Place the patient in a supine, head-down position to fill the jugular vein. Turn the patient's head to the opposite side (i.e., looking away from the proposed cannulation site).
2. Clean the skin with alcohol.
3. Align the cannula with the vein, with the point of the needle aimed at the shoulder on the same side.
4. While applying pressure to the vein above the clavicle to provide a tourniquet effect, make the venipuncture midway between the angle of the jaw and the clavicle.



Notes

Anatomy

The external jugular vein is formed below the ear, and behind the angle of the mandible, where a branch of the posterior facial vein joins the posterior auricular vein. The external jugular vein then passes downward, and obliquely backward, across the surface of the sternomastoid muscle before piercing the deep fascia of the neck just above the middle of the clavicle, ending in the subclavian vein lateral to the anterior scalene muscle. Valves are present in this vein at the entrance to the subclavian vein, and about four centimeters above the clavicle.



PR14: Orogastric Tube Placement

Applicable To

- ACP and higher

Introduction

High volumes of air or fluid in the stomach can significantly affect a patient's ability to be ventilated by bag-valve mask, and limit the effectiveness of chest compressions by inhibiting the return of venous blood to the chest. In these cases, the stomach should be decompressed by placement of an orogastric tube.

Indications

- Cardiac arrest
- Gastric distension interfering with effective ventilations

Contraindications

- Nasogastric tube placement is contraindicated in cases of basilar skull fractures
- Use extreme caution if there is a history of caustic ingestion or esophageal varices

Procedure

1. Assemble and prepare equipment:
 - Gastric tube (14 Fr or 16 Fr)
 - Water soluble lubricating gel
 - Laryngoscope
 - 30 – 60 mL catheter-tip syringe (not Luer Lock)
 - Stethoscope
 - Personal protective equipment, including gloves and face shield
 - Suction tubing
 - Tape
2. Estimate the length of tube required: measure the distance from epigastrium to the corner of the mouth or nose, passing by the earlobe
3. Using aseptic technique, lubricate the distal 7.5 to 10 cm of the tube
4. Visualize the esophagus using the laryngoscope
5. Insert the tube and advance to the desired depth
6. Check tube placement by auscultating over the epigastrium while injecting 20-30 mL of air down the tube. Bubbling or "whooshing" sounds should be heard. If sounds are not heard, advance the tube by another 2.5-5 cm and re-check.
7. Once tube placement has been confirmed, secure the tube with tape. Connect to suction at low vacuum.

PR15: Tracheal Tube Introducer

Applicable To

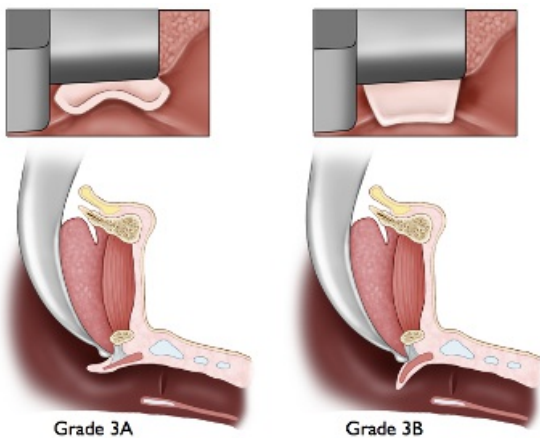
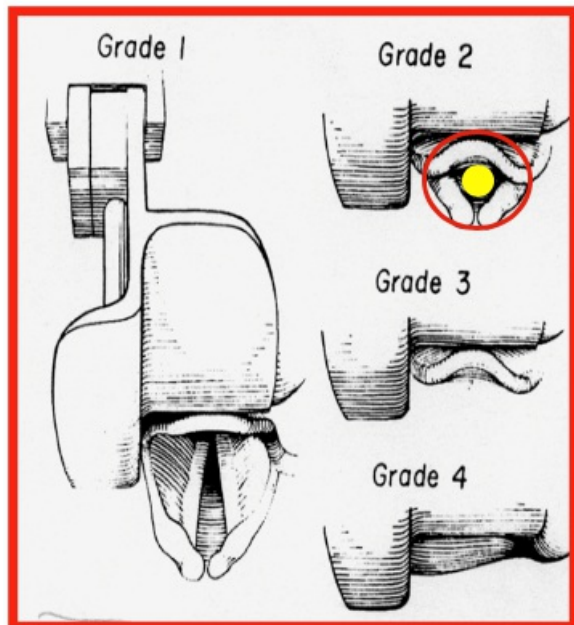
■ ACP and higher

Introduction

The tracheal tube introducer (bougie) is a tool to assist with the placement of an endotracheal tube into the trachea in cases where an optimal view cannot be obtained on direct laryngoscopy after lifting the head, performing extralaryngeal manipulation, or both.

Indications

Although bougies may be used in virtually all scenarios, they are intended primarily for patients who demonstrate a Grade 3A Cormack-Lehane view on laryngoscopy: the epiglottis is upturned, and the arytenoid cartilages may or may not be visible. They can also be helpful in patients with Grade 2 views to assist in tube placement.



Contraindications

Bougies are not intended for use in patients with Grade 3B or 4 views; paramedics should not “fish” with the bougie in search for the glottic opening and the trachea.

Procedure

1. Introduce the coudé tip of the bougie from the right corner of the patient's mouth.
2. Advance the bougie towards midline, beneath the epiglottis, while attempting to keep the distal tip in contact the posterior surface of the epiglottis.
3. A slight "pop" or distinct tactile change may be felt when the bougie passes through the glottic opening. Two separate tactile phenomena will allow paramedics to confirm the bougie is in the trachea rather than the esophagus:
 1. Once the bougie has passed through the vocal cords, a fine "clicking" sensation may be felt as the bougie tip rubs against the cartilage rings in the trachea. (Some operators describe this as a "sandpaper" feeling in the bougie.)
 2. With continued advancement, the bougie will eventually "hang up" in a smaller distal airway. In most patients, this will occur around the 30 cm mark. If the bougie can be advanced further than 30 or 35 cm, it is very likely in the esophagus. Once "hold up" has been achieved, the bougie should be withdrawn to around the 25 cm mark (i.e., out of the smaller distal airways and bronchi and back into the trachea).
4. The endotracheal tube can be advanced over the bougie and into the trachea. Hold the laryngoscope in position during this process; do not remove the blade until the cuff on the endotracheal tube is inflated. Continued laryngoscopy will help the endotracheal tube to advance into the trachea.
5. Common problems with bougie use include:
 1. Failure to access the trachea. This is often the result of the bougie becoming caught on a vocal fold. To resolve, rotate the bougie to the left or right while maintaining forward pressure.
 2. Failure to advance the endotracheal tube. This is often caused by the bevel of the endotracheal tube catching on the right vocal fold. Hold the laryngoscope in position and rotate the tube counter-clockwise by 90°; this will direct the bevel away from the right fold and allow smoother passage. If this fails to allow the tube to advance, consider a smaller tube size.

Resources

References

1. Kovacs G, et al. Airway Management in Emergencies. Second Edition. 2011.
2. Levitan R. Tips for Handling the Bougie Airway Management Device. 2014. [\[Link\]](#)
3. The Resus Room. Why I Use a Bougie on Every Airway. 2017. [\[Link\]](#)

PR16: 12-Lead ECG Acquisition

Applicable To

- PCP as trained and authorized, or under direction
- ACP and higher

Introduction

The 12-lead electrocardiogram is one of the most useful diagnostic tests in medicine, and is a critical component of prehospital care and decision-making. It allows paramedics to view the rhythm of the heart, and provides important information about the state of blood flow to various regions of the heart.

Indications

Suspicion of cardiac ischemia or rhythm disturbance.

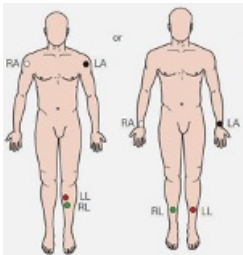
Contraindications

As a diagnostic procedure, there are few absolute contraindications to 12-lead ECG acquisition. Paramedics must ensure that the time needed to acquire a 12-lead ECG does not interfere with priority patient management tasks.

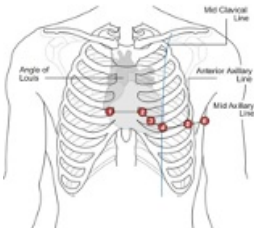
Procedure

Procedure: Standard 12-Lead ECG

1. Assemble required equipment. Connect electrodes to lead wires before placing them on the patient, and connect the cables to the monitor. Ensure cables are not tangled.
2. Prepare the patient's skin as discussed below in "Notes."
3. Place the limb leads in the appropriate locations. RA and LA leads can be placed on the deltoids or wrists. RL and LL should be placed near the ankles (or alternatively on the lower left leg). In all cases, ensure the leads are not positioned over bone.



4. Landmark and place the precordial leads in their appropriate locations. Find the clavicle, and identify the angle of Louis as illustrated.



1. V1 is located at the fourth intercostal space to the right of the sternum.
2. V2 is also in the fourth intercostal space, but on the left side of the sternum.
3. V3 is located between V2 and V4. For ease of placement, inexperienced operators should place V3 *after* V4 has been positioned.
4. V4 is placed in the fifth intercostal space on the mid-clavicular line. Generally, this will be inferior to the

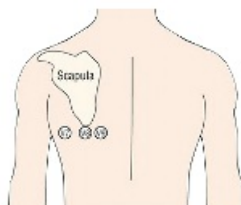
left nipple.

5. V5 is also in the fifth intercostal space, but on the anterior axillary line.
6. V6 is level with V5 on the mid-axillary line.
5. Ask the patient to remain still, relax their body, not talk, and to breathe calmly. Press the "12 Lead" button on the LifePak 15. The monitor will prompt for an age and gender. Use the scroll wheel to enter the requested information, and push the wheel down to confirm each entry. (This information is critical for the machine interpretation algorithm, and can also affect the processing of ECG signals by the LifePak. Paramedics must make every effort to enter this information accurately.)
6. The monitor will attempt to acquire the ECG. If **NOISY DATA – PRESS 12 LEAD TO ACCEPT** appears, attempt to identify the source of the problem (e.g., loose electrode contact, patient movement, tension on the lead wires) and correct the issue. The LifePak will abandon the ECG recording if the noisy data persists for more than 30 seconds (**EXCESSIVE NOISE – 12 LEAD CANCELLED**); in this case, restart the acquisition process by pressing "12 Lead" again. If the noise persists, the LifePak can be forced to acquire an ECG at the discretion of the ACP – press the "12 Lead" button when prompted to override.
7. If the ECG is to be transmitted, press the "Options" button and select "Patient" from the menu. The patient's name, PHN or date of birth (in the "Patient ID" field), and the onset of pain (in the "Incident ID" field) can then be entered using the scroll wheel. The inclusion of this information is very important to minimize delays on arrival at hospital.
8. To transmit the ECG, press the "Transmit" button. Select the desired ECG record and destination site, then select "Send" from the menu.
9. ECGs may be re-printed by pressing "Options," selecting "Print," and then choosing the appropriate record.

Procedure: Posterior Leads

In some cases, a view of the posterior heart is needed, particularly in patients with marked precordial ST depression.

1. Acquire a standard 12-lead ECG
2. Disconnect V4, V5, and V6 from their traditional placements
3. Using new electrodes, with the patient leaning forward:

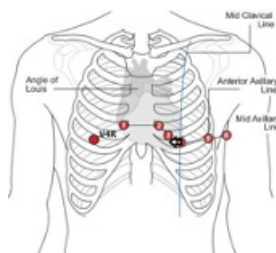


1. Place the V4 electrode on the left posterior axillary line in the same plane as V6. This electrode becomes V7.
2. Place the V5 electrode at the tip of the left scapula, in the same horizontal plane as V6. This electrode becomes V8.
3. Place the V6 in the left paraspinal region, in the same plane as the other electrodes. This electrode becomes V9.
4. Acquire the ECG
5. Once the LifePak prints the ECG, mark V4, V5, and V6 with their new designations of V7, V8, and V9

Procedure: Right-Sided Leads

The right-sided chest lead is very helpful in diagnosing right ventricular infarctions.

1. Acquire a standard 12-lead ECG
2. Disconnect V4 from its traditional placement
3. Using a new electrode, place V4 in the fifth intercostal space on the mid-clavicular line. This becomes V4R, and is essentially the "mirror image" of V4 on the left chest.



4. Acquire the ECG
5. Once the ECG is printed, mark V4 as "V4R"

Notes

- 12-lead ECG acquisition is a relatively intimate procedure. Paramedics should strive to preserve patient dignity whenever possible by using gowns or towels.
- Tips for improved ECG quality:
 - Skin preparation can significantly improve the quality of the ECG signal. Shave hair at the site of electrode placement whenever possible. An alcohol wipe can be used to help dry the skin when it is sweaty, and a gauze pad can be used to rub the skin briskly to remove sweat, oil, and dead skin cells, improving contact.
 - The conduction of ECG electrodes is improved as they warm. Consider ensuring that electrodes are stored at room temperature (up to body temperature is ideal).
 - Do not press on the center of the electrode while applying it to the patient. Press around the circumference of the electrode to ensure proper adhesion.
- Patients should be supine or semi-recumbent during ECG acquisition.
- The Angle of Louis can be identified by placing a finger in the notch at the top of the sternum. Move the finger downward until a slight ridge or bump is felt, then slide the finger laterally to the patient's right side to locate the second rib and the second intercostal space immediately below. Count down two more intercostal spaces; this is the fourth intercostal space, and V1 is placed immediately adjacent to the sternum.
- V4 may be placed under the breast if necessary.
- In patients who have been resuscitated from cardiac arrest, wait at least ten minutes following sustained return of spontaneous circulation before attempting to record a 12-lead ECG.

Resources

(tbd)

References

BCEHS STEMI Program Manual (link forthcoming)

PR17: Procedural Sedation

Applicable To

- ACP and higher

Introduction

Procedural sedation and analgesia (PSA) is a medication administration strategy that uses several small serial doses of a medication to produce analgesia, sedation, and amnesia to allow paramedics to accomplish patient care tasks.

Indications

Any instance where analgesia, sedation, and amnesia are required to allow paramedics to accomplish patient care tasks. Examples of these tasks include extrication, fracture management, cardioversion, and airway management.

Contraindications

- ABSOLUTE: INABILITY TO MONITOR OXYGENATION AND VENTILATION
- ABSOLUTE: INABILITY TO PERFORM AIRWAY INTERVENTIONS
- Relative: traumatic brain injuries
- Relative: hypotension and shock

Procedure

CliniCall consult (1-833-829-4099) is required for patients under 12 years of age, and recommended in all other patients where possible.

1. Ensure adequate oxygenation and ventilation at all times. Consider use of high-flow nasal cannula, with PEEP and bag valve mask as necessary. Monitor oxygen saturation and ventilation closely.
2. If not already in place, establish vascular access with running fluid.
3. Choose dosing strategy for ketAMINE:
 - Initial dose: 0.5 mg/kg
 - Subsequent doses: 0.25 mg/kg
 - Give ketAMINE slowly, waiting 60 seconds between doses, until desired level of sedation reached.
 - In hypotensive or shocked patients, consider reducing the doses of ketAMINE further. Consult with CliniCall if necessary.
4. Some patients will experience emergence reactions from ketAMINE sedation and analgesia. These include hallucinations and vocalizations, and can have physical manifestations. Treat emergence reactions only if they occur and are sustained:
 - In adults: mIDAZOLam 1-2 mg IV/IO/IM every 2-3 minutes as required.
 - In children: mIDAZOLam 0.1 mg/kg to 1 mg IV/IO/IM every 2-3 minutes as required.

PR18: Anesthesia Induction

Applicable To

■ ACP and higher

Introduction

Anesthesia Planning

In the context of BCEHS practice, planning for anesthesia is synonymous with planning for invasive airway management. Patients who are not completely obtunded will require some level of sedation and anesthesia prior to being intubated, and paramedics must consider multiple factors when planning an induction strategy.

The goals of anesthesia, for all patients, are four-fold:

1. Critical to the long-term psychological well-being of patients being intubated; can be achieved with the use of ketAMINE or mIDAZOLam.
2. In addition to reducing patient discomfort, effective analgesia reduces the amount of sedation required post-intubation. Can be achieved using ketAMINE and fentaNYL.
3. Autonomic stability. Virtually all patients being intubated prehospitally require some degree of resuscitation during the peri-intubation phase. Hypotension post-intubation can be lethal. Autonomic stability can be achieved using fluid and push-dose vasopressors such as PHENYLephrine or EPINEPHrine.
4. The loss of muscle tone and suppression of reflexes improves the overall ability of the intubator to access the trachea. Effective areflexia also lowers the total sedation requirements. It is, however, fraught with complications and can be extremely dangerous. Succinylcholine and rocuronium are used to achieve areflexia; deep sedation does not produce areflexia, but instead suppresses the response to painful stimulus.

Shock Physiology

Maintaining autonomic stability is critical to ensuring patient safety in the peri-intubation period. Because good outcomes cannot be achieved from a poor starting point, all patients must be adequately resuscitated prior to intubation. At a minimum, this involves a fluid bolus of normal saline of at least 500 mL.

The shock index (SI) is calculated by dividing the heart rate by the systolic blood pressure. Normal physiology has a shock index of less than 1; shocked states have an index of greater than 1. An approximation can be made by comparing the heart rate to the systolic blood pressure: if the heart rate is greater than the systolic blood pressure, the patient requires additional support during the peri-intubation phase. In these cases, PHENYLephrine as a push-dose vasopressor is used to help support blood pressure prior to and after intubation. EPINEPHrine is also available as a push-dose vasopressor for critically ill patients who are at imminent risk of cardiac arrest.

Summary of Pharmacology

Goal	Options	Induction	Maintenance	Emergence
Analgesia	fentanyl ketAMINE	Covered with KetAMINE	Covered with ketAMINE	fentaNYL 50 - 100 mcg as required
Amnesia	mIDAZOLam ketAMINE	Adult: ketAMINE 2 mg/kg if SI < 1 ketAMINE 1 mg/kg if SI ≥ 1 Pediatric: ketAMINE 1 mg/kg if perfusion is normal ketAMINE 0.5 mg/kg if hypoperfusion present Consider ½ normal ketAMINE dose if GCS < 8	Use ½ of induction dose every 10-5 minutes as required	mIDAZOLam 1 - 5 mg as required
Autonomic Stability	IV fluids PHENYLEphrine EPINEPHrine	Normal saline 500 mL PHENYLEphrine 100 mcg IV to achieve SBP ≥ 90 mmHg EPINEPHrine 10 mcg slow IV push in peri-arrest	Normal saline 500 mL as required PHENYLEphrine 100 mcg IV as required	Normal saline as required
Areflexia	ROCuronium Succinylcholine	Not available to advanced care paramedics at BCEHS		

Contraindications

- Absolute: inability to monitor oxygenation and ventilation
- Absolute: inability to perform airway interventions
- Relative: traumatic brain injuries
- Relative: hypotension and shock

Consider the use of alternative techniques (e.g., supraglottic airway devices, awake intubation techniques) if induction of anesthesia is judged unsafe, or if it cannot be accomplished due to logistical factors.

Procedure

1. Ensure adequate oxygenation and ventilation throughout the procedure. Monitor pulse oximetry, blood pressure, and heart rate. Assign roles and delegate tasks as part of crew resource management. Consider consultation with ClinCall if clinical situation permits.
2. If not already done, establish vascular access and verify the line is patent.
3. Prepare and label medications, including vasopressors based upon shock index calculation. PHENYLEphrine should be available at all times to manage post-intubation hypotension.

For adult patients

4. Start normal saline bolus of 500 mL
5. If shock index ≥ 1 (or predictors of hypotension are present):
 - [PHENYLEphrine](#) 100 mcg IV/IO every 3-5 minutes as required to maintain systolic blood pressure ≥ 90 mmHg
 - [ketAMINE](#) 1 mg/kg IV/IO
6. If shock index < 1:
 - [ketAMINE](#) 2 mg/kg IV/IO

7. For maintenance:
 - [ketAMINE](#): ½ of the induction dose every 10-15 minutes as required to maintain sedation
 - [fentaNYL](#): 50 to 100 mcg IV/IO every 10-15 minutes as required if pain is believed to be a major factor
 - Normal saline: 250-500 mL as required
 - [PHENYLephrine](#): 100 mcg IV/IO every 3-5 minutes as required to a maximum of 500 mcg. If additional PHENYLephrine is needed, consult with ClinCall

For pediatric patients

4. Start normal saline bolus of 10 mL/kg
5. If signs of inadequate perfusion are present (relative bradycardia, $SBP < 70 + (2 \times \text{age})$):
 - [EPINEPHrine](#) 1 mcg/kg slow IV/IO every 3 to 5 minutes as required
 - ketAMINE 0.5 mg/kg IV/IO
6. In patients with adequate perfusion and heart rate:
 - ketAMINE 1 mg/kg IV/IO
 - EPINEPHrine on "stand-by" 1 mcg/kg slow IV/IO every 3 to 5 minutes as required
7. For maintenance:
 - ketAMINE: ½ of the induction dose every 10-15 minutes as required to maintain sedation
 - MIDAZOLam: consider addition of benzodiazepine at 0.1 mg/kg as required
 - fentaNYL: consider 1 to 3 mcg/kg IV/IO every 10 to 15 minutes if pain is believed to be a major factor
 - Normal saline: 10 mL/kg as required
 - EPINEPHrine: 1 mcg/kg slow IV/IO as required

Resources

(Will either be a link to a YouTube video or embedded or an image)

PR19: Transcutaneous Pacing

Applicable To

- ACP and higher

Indications

Transcutaneous pacing is indicated for symptomatic bradycardia unresponsive to atropine and epinephrine infusions.

Contraindications

Paramedics should be aware of the distinction between pacing modes: demand pacing paces only when the patient's intrinsic heart beat is less than a specified threshold, while non-demand paces at a set rate regardless of intrinsic activity. The monitor/defibrillator only detects electrical activity: under some circumstances, patients may have electrical activity that exceeds the pacing threshold but no mechanical output. In these cases, the patient will not be paced if the monitor is in demand mode. BCEHS monitor/defibrillators default to demand mode and, in general, should not be operated in non-demand mode.

Procedure

1. Transcutaneous pacing requires placement of limb leads and therapy electrodes. Ensure that limb leads are on and connected to the LifePak 15.
2. Position therapy electrodes. Either anterior-lateral or anterior-posterior electrode placement is acceptable.
3. Consider the need for sedation. Pacing is painful, and patients who are conscious will require sedation and analgesia. Ketamine is the preferred agent in this case.
4. Enable pacing mode on the LifePak by pushing the "Pacing" button. The monitor will prompt for a rate (the default is 60 BPM) and a current (the default is 0 mA).
5. Slowly increase the current using the selector wheel until electrical capture is identified.
6. Confirm a mechanical output with each captured paced beat. Femoral pulses may be more useful, as they are further away from the muscle groups being stimulated by the pacemaker. If mechanical output is confirmed, add 10% to the current setting.
7. Reassess blood pressure and clinical status. If the patient remains hypotensive despite effective pacing, consider increasing the rate.

Notes

CAUTION

- When conducting handovers of pacing-dependent patients at hospitals, clear communication and coordination of the transfer of pacemaking equipment is critical. Do not disconnect monitor components, *including limb leads*, until hospital staff confirms the patient is attached to their equipment and ready to take over pacing.
- Never attempt to resolve tachydysrhythmias using non-demand or "overdrive" pacing.
- When using non-demand pacing, there is a risk of causing an R-on-T event resulting in ventricular fibrillation or ventricular tachycardia, as the monitor will deliver pacing impulses regardless of intrinsic electrical activity. In situations where the patient is bradycardic but has electrical activity that exceeds the rate limit for demand pacing, paramedics should consult with CliniCall to discuss treatment options, which may include higher pacing rates or pharmacological therapy.

PR20: Synchronized Cardioversion

Applicable To

- ACP and higher

Indications

Synchronized cardioversion is indicated for the termination of tachydysrhythmias in symptomatic patients who have failed less invasive therapies. It is often more effective and consistent than pharmacological therapies, and is generally safer for unstable patients when the precise nature of the tachydysrhythmia is not known.

Procedure

1. Consider the need for procedural sedation (see [PR17: Procedural Sedation](#)).
2. Attach therapy electrodes. Either anterior-posterior or anterior-lateral positioning may be used. Synchronized cardioversion may be performed with therapy electrodes alone, however limb leads are strongly suggested.
3. Enable synchronized mode: press the "Sync" button on the monitor. Observe the display screen and confirm the flagging symbol (a downward-pointing triangle) appears above each QRS complex.
4. Select the appropriate energy level using the "Energy Select" buttons.
5. Charge the monitor/defibrillator and clear the patient.
6. Push **and hold** the shock button until the energy is delivered. There will be a slight delay as the monitor attempts to time the shock with a detected R wave.
7. Reassess the patient and re-evaluate required treatment options, including supportive care or energy escalation.
8. If the patient deteriorates to ventricular fibrillation or unstable polymorphic ventricular tachycardia:
 1. Confirm synchronization is off (push "Sync" button again if necessary) and that flags have disappeared. Verify patient pulses; if no pulse, start chest compressions.
 2. Reset the energy level to 200 J.
 3. Charge the monitor.
 4. Clear the patient and deliver the shock.

Notes

- Recommended initial energy levels:
 - Unstable atrial fibrillation with rapid ventricular response: 200 J.
 - Unstable monomorphic ventricular tachycardia: 100 J.
 - Unstable supraventricular tachycardia or atrial flutter: 100 J.
- If several synchronized shocks have been delivered and the rhythm fails to convert, consider switching pad placement: if the therapy electrodes were anterior-lateral, place them anteriorly-posteriorly (or vice versa) and attempt to cardiovert again at the last energy level used.

Resources

(Will either be a link to a YouTube video or embedded or an image.)

PR21: Needle Thoracentesis

Applicable To

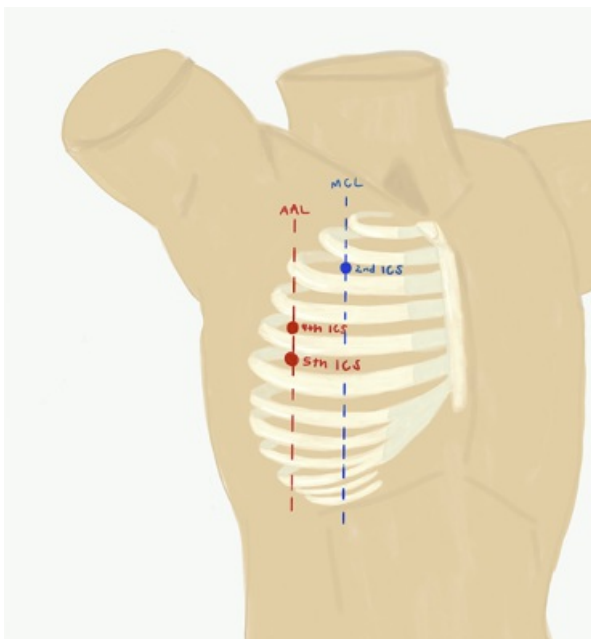
- ACP and higher

Indications

Needle thoracentesis is indicated for the decompression of tension pneumothorax with deteriorating vital signs indicating markedly decreased cardiac output, profound shock, or cardiac arrest. Bilateral decompression is also indicated in cases of blunt traumatic cardiac arrest.

Procedure

1. Identify the insertion sites. The preferred site is the fifth intercostal space on the mid-axillary line (in the diagram, this is the red line incorrectly labelled "AAL"). An alternative placement is the second intercostal space on the mid-clavicular line. The ARS needles used by BCEHS will be effective at either site.
2. Prepare the skin by cleaning it with an alcohol swab.
3. Remove the ARS needle and catheter from its protective case. Puncture the skin, directing the needle above the inferior rib (blood vessels and nerves underly the inferior border of each rib). Air may be heard hissing as the needle passes into the pleural space.
4. Advance the catheter into the pleural space and remove the needle.
5. Leave the catheter open to air. It is not necessary to place a chest seal over the catheter



PR22: Surgical Airways

Applicable To

- ACP and higher

Introduction

A surgical airway is indicated in a patient who cannot be oxygenated or ventilated through other means. Paramedics may also consider preparing for surgical airways based on predicted clinical course, or in cases where endotracheal intubation is required and predicted to be difficult.

In patients over the age of 8, the bougie-assisted cricothyrotomy is the preferred approach. In patients under 8, needle cricothyrotomy can be used.

These procedures can be intimidating. Paramedics should have a thorough understanding of the circumstances under which they may be required, and have a low threshold for their use. They can also be logistically challenging and frequently require more space (and personnel) than anticipated. In most cases, paramedics will want to approach a surgical airway with their non-dominant hand towards the patient's head.

Indications

Inability to ventilate, oxygenate, or intubate a patient.

Contraindications

- **ABSOLUTE: INABILITY TO IDENTIFY LANDMARKS OR AIRWAY STRUCTURES**
- Relative: trauma to the neck.
- Relative: history of perithyroid tumors or radiation to the neck.
- Relative: expanding hematomas or other pathologies distorting structures in the neck.

Procedure

Procedure: Bougie-Assisted Cricothyrotomy

1. Personal protective equipment is required for this procedure. Face shields are critically important: upon puncturing the cricothyroid membrane, a spray of blood is frequently produced.
2. Assemble required equipment: scalpel blade, bougie, and 6.0 ETT.
3. Identify the landmarks as required.
4. Stabilize the thyroid cartilage with the non-dominant hand. The dominant hand will hold the scalpel and rest on the patient's sternum for stability.
5. Make a 4 cm vertical incision through the skin over the cricothyroid membrane. In cases where the anatomy cannot be palpated or identified prior to making the incision, it may be necessary to extend the incision from the mandible to the sternum.
6. Palpate the cricothyroid membrane and bluntly dissect through the subcutaneous tissue using a finger until the membrane is readily identifiable. Puncture the membrane with the scalpel held horizontally.
7. Remove the scalpel and place a little finger in the incision in the membrane to dilate, and to identify the posterior wall cartilage. Ignore any bleeding at this point.
8. Slide the bougie alongside the little finger into the trachea.
9. Remove the finger and pass the endotracheal tube over the bougie and into the trachea. Only advance the endotracheal tube until the balloon is within the airway and no longer visible. Inflate the balloon.
10. Holding the endotracheal tube firmly, remove the bougie and connect a bag-valve mask. Confirm endotracheal tube placement with end-tidal CO₂ monitoring, auscultation, bilateral chest rise and fall, and misting of the tube.

Procedure: Needle Cricothyrotomy

Children under the age of 8 should not have open cricothyrotomies as there is an unacceptable risk of causing damage to poorly-developed structures in the airway. Needle cricothyrotomy is an option in these cases. Paramedics must remember this procedure is a bridge to definitive airway management: it is possible, using this technique, to oxygenate (but not ventilate) a patient for a brief period of time, typically 15 to 20 minutes.

1. Assembled required equipment:
 1. 14 or 16-gauge catheter over needle. Remove the flash cap from the needle.
 2. 10 mL syringe
 3. 0 endotracheal tube. Remove the universal connector from the endotracheal tube.
2. Identify landmarks: the cricothyroid membrane in children is located in the same position as adults, and should be palpable through the skin below the thyroid cartilage.
3. Mount the needle and catheter on the syringe. Hold the syringe in the dominant hand, which is stabilized on the patient's mandible.
4. Puncture the skin over the cricothyroid membrane. Once through the skin, the needle tip should be directed caudally (i.e., towards the feet). While stabilizing the needle and catheter with the non-dominant hand, draw back on the syringe and maintain negative pressure. Advance slowly towards the trachea.
5. Once the needle enters the trachea, the plunger will release. Advance the needle slightly, then withdraw the needle while threading the catheter into the trachea.
6. Insert the endotracheal tube connector into the hub of the catheter, and connect a bag-valve mask attached to high-flow oxygen. Ventilate, being aware that higher pressures may be required and that chest rise may not be seen. The pressure relief valve may need to be locked down.
7. Secure the catheter with an occlusive dressing (e.g., Tegaderm).

Notes



SURGICAL CRICOTHYROTOMY - FONA

When do I use it ?



What equipment do I need?

- ☒ #10 Scalpel
- ☒ #6 ETT
- ☒ Bougie
- ☒ 10 mL syringe

BCEHS Medical Programs & Learning

Last Updated: March 2016

What are some key landmarks?

Need support?

Please contact
Learning@bcces.ca
 or your **Regional
 Advanced Practice
 Educator**



How do I use it?

1. Landmark
2. Make incision
3. Place finger
4. Place bougie
5. Pass ETT
6. Secure and Confirm

Personal Protection

Adapt PPE based on your risk assessment, patient's condition e.g. infectious diseases.
 Best practice: full face shield, gloves, N95

What can make it difficult?

Distortion	Trauma, expanding hematoma, infection or other pathology
Access	Obesity, extreme neck flexion (i.e. ankylosing spondylitis)
Radiation	Therapy in area
Tumors	Around cricothyroid membrane

BCEHS Medical Programs & Learning

Last Updated: March 2018

Resources

PR23: Awake Intubation

Applicable To

- ACP and higher

Introduction

Awake intubation is a tracheal intubation technique that uses topical anesthesia to blunt airway reflexes, coupled with small doses of intravenous anesthetic for sedation. Patients undergoing an awake intubation are not necessarily fully "awake"; the technique refers to the limited use of sedation or induction to achieve optimal intubating conditions.

Indications

Paramedics should consider the use of awake intubation as a primary intubation technique when doubt exists as to the ability to successfully intubate a patient while protecting the patient's intrinsic respiratory drive and gas exchange physiology. These scenarios can be broken into two broad categories:

1. Patients with predicted difficult airway anatomy. These are based either on normal variations, or pathological changes in airway structures.
2. Predicted difficult physiology. Hemodynamic instability (or an inability to obtain hemodynamic stability) may not allow for the use of induction agents at full dose. Patients may also have a physiological need for high minute ventilation, and may not tolerate even brief interruptions to their respiratory activity.

Contraindications

Awake intubation is relatively contraindicated in patients who require emergent airway management, as it can be a time-consuming procedure. Patients who are actively or passively uncooperative may not benefit from an awake approach, and where possible should be managed using other techniques.

Procedure

Awake intubation is a relatively complex procedure. This procedure summarizes the steps required for awake intubation, but paramedics should not rely solely on this information for education and training in this technique.

1. Provide appropriate supplemental oxygen during application of topical anesthesia. Ensure appropriate monitoring is attached to the patient, and that all vascular access devices are flowing properly.
2. Explain the rationale for the procedure to the patient. Provide information on what can be expected during the procedure; patient cooperation during the topicalization phase of the procedure results in improved intubating conditions.
3. Have the patient stick their tongue out, and begin applying topical anesthesia to airway structures. The soft palate, posterior pharynx and tonsillar pillars should be anesthetized using a "spray as you go" approach. Consider the judicious use of sedation during this phase, respecting physiological limitations.
 1. When using direct laryngoscopy, additional local anesthetic can be applied to distal structures as they are exposed by the blade.
4. Using precision laryngoscopy techniques, slowly advance the blade of the laryngoscope until it is in position.
5. Intubate the patient.
6. Confirm tube placement using traditional techniques.
7. Administer additional sedation as required for patient comfort based upon clinical condition and hemodynamic status.

Resources

[Awake airway management and flexible endoscopic intubation](#), by J. Adam Law, Ian Morris, and George Kovacs.

References

Morris IR, Law JA. How to do awake tracheal intubations -- oral and nasal. In: Kovacs G, Law JA, editors. *Airway management in emergencies*. 2nd ed. Shelton: People's Medical Publishing House USA; c2011. p. 181-208.

PR24: Subcutaneous Butterfly Placement

Applicable To

- ACP and higher

Introduction

To provide guidelines to paramedics for the establishment of a subcutaneous (SQ) injection site and for the safe and, accurate intermittent administration of medications via subcutaneous injection site to the palliative care population for pain and symptom management when other routes are not possible or established.

Procedure

1. Consult with EPOS prior to establishing a SQ route and prior to administering medication/fluids via a SQ line.
2. Gather your equipment, perform hand hygiene, and don clean gloves.
3. Select the subcutaneous site:
 1. Note: site must be changed every 7 days to maintain patency and sites rotated to avoid tissue damage)
4. Cleanse site (circular area 5-8 cm) with chlorhexidine/alcohol swab and allow to dry.
5. Remove slide clamp from the subcutaneous butterfly if preferred, as clamp is not required after insertion.
6. Remove the vent plug and attach a needleless connector/luerlock to the side Y port.
7. Prime the set with medication (additional 0.4 mL for priming the set including the luerlock).
8. Rotate the white safety shield 360° to loosen the needle. Ensure the bevel is up and catheter is not extended over the needle tip/bevel.
9. Pinch the textured yellow wings together, textured side down
10. Gently pinch the skin fold and insert the needle at a 30-45 degree angle to the full length of the needle.
11. Hold the wings flat on the skin firmly (do not hold the centre bar). Pull back on the white safety shield in a straight continuous motion until the safety shield separates leaving the cap.
12. Apply an opsite sterile transparent dressing. Loop the extension set and secure in place.
 1. Optional: can place gauze under the port to protect the skin from pressure.
13. Label the dressing: Record the name of medication and concentration, date and time of insertion, your initials, and your designation.
14. Record insertion on Siren documentation including the following:
 1. Date & time, drug, concentration, dose, route
 2. Injection site and catheter size
 3. Site assessment
 4. Patient's response to procedure and any patient/family education or any other pertinent actions or observations
 5. Individual who inserted the catheter and administered the medication

Notes

General Directives:

- Do NOT flush tubing (medication remaining in tubing will be given during the next administration).
- Consult with EPOS prior to establishing a SQ route and prior to administering medication/fluids via a SQ line.
- The site should be assessed for redness, bruising, swelling, tenderness, leakage or discharge. Re-site if any of these are present.
- The subcutaneous site is to be changed every 7 days or sooner to maintain patency. If two sites are being used, then two separate locations should be used (Rotate sites).
- To help optimize medication absorption and patient comfort, the maximum amount of medication to be administered at one time/site is 2 mL. If greater volume is required, two sites can be used to deliver the required amount. Must wait 30 min between doses at the same site.

- Note* More than one SQ site is required for multiple medications.
- Sites for catheter insertion are to be rotated to avoid tissue damage.
- If blood appears in the tubing, remove and discard the subcutaneous set and select a new injection site.

Equipment & Materials

- #24 gauge butterfly needle
- Chlorhexidine 2% or 70% Isopropyl alcohol swab
- Transparent dressing (eg. Opsite or Tegaderm)
- Tape
- Non sterile gloves/latex free
- Needleless butterfly syringe with luer lock containing medication dose ordered, plus an additional 0.4 mL of the medication for priming the needle and tubing set, at the time of initial dose administration
 - Volume may be different if using product other than Saf-T-intima and Baxter One Link Needle-free IV connector

Preferred Injection Sites

- Upper arms
- Abdomen
- Anterior aspect of thighs
- Above scapula
- Subclavicular chest wall

Note *Site should be easily accessible, free of lesions, away from large vessels, joints and bones, and away from edematous tissue that may alter medication absorption.

References

Provincial Health Services Authority (2013). BC Cancer Agency: Intermittent and Continuous medication administration via an established Subcutaneous Injection Site.

Provincial Health Services Authority (2009). BC Children's Hospital Child and Youth Health Policy and Procedure manual: Continuous Subcutaneous Medication or Fluid Infusion.

PR25: Pinel Restraints

Applicable To

- EMR and higher

PR26: Venipuncture - Ethical Decision Making

Ross Chute

Applicable To

■ PCP and higher

Introduction

Initiating a pre-hospital IV “just in case it is needed in hospital” is not a justifiable reason.

When should paramedics initiate peripheral intravenous access? What questions do we need to ask ourselves to help us make an ethical and clinical appropriate decision?

The criteria can be found in the BCEHS Ethics Framework Manual. Paramedics can also utilize the “JAY” tool to evaluate the risk versus benefit of pre-hospital IV access

Indications

The clinical requirements for pre-hospital IV access:

1. To provide a saline bolus to treat hypotension, severe dehydration, or shock. To keep vein open (TKVO) is not generally a reasonable requirement;
2. As a route to provide intravenous medication bolus administration (e.g. dimenhydrinate)
3. As a route to provide an intravenous infusion of medications (e.g. 10% dextrose or TXA)
4. As directed by Clinical Practice Guidelines (e.g. FASTVAN (+) patients)
5. For PCPs, in preparation for on-scene or en-route rendezvous of ACPs or CCPs when it is expected that IV medications will be administered (e.g. cardiac arrest with epinephrine)

Procedure

Ethical Decisions – Establishing Pre-Hospital Intravenous Access

When consolidating the care plan, paramedics should consider:

1. Does the patient require IV access for treatments within the pre-hospital care plan?
Yes. For reasons of fluid administration, medication administration, or CPG requirement
No. Then don't attempt an IV in the field.
2. Why am I initiating this IV start?
 1. For patient care that requires fluid administration, medication administration, or CPG direction – (Let's apply the JAY tool)
 1. JUSTIFIABLE:
 1. The patient is hypovolemic, severely dehydrated, in shock, and requires fluid administration
 2. The patient is actively vomiting and requires dimenhydrinate
 3. The patient has significant blunt or penetrating trauma and requires TXA
 4. The patient is hypoglycemic and requires IV dextrose
 2. ACCOUNTABLE:
 1. This procedure will benefit the patient and my peers would offer the same or similar care to this patient.
 3. YOU:
 1. If I were the patient, I would appreciate the benefit of fluid replacement and the relief the medication offers for my dignity and comfort.
 2. Skill maintenance or learning purposes – (Let's apply the JAY tool)

1. JUSTIFIABLE:
 1. Skill maintenance would not be defensible in an adverse patient event?
 2. Pre-hospital IV access increases the patient's risk to harm due to preventable infection and potential for embolism or thrombosis
 3. Did you inform the patient of the reason(s) and the risks associated with the IV start? (Informed consent for skill maintenance or learning only purposes)
 4. Did you ask the patient for permission to start the IV?
 2. ACCOUNTABLE:
 1. Practicing skills on patients are poor arguments for skill maintenance or learning. We don't practice chest compressions on a patient that has a pulse. We have simulators available for skill maintenance purposes.
 3. YOU:
 1. Would you want an unnecessary IV insertion if you didn't require one? Knowing the evidence of infection rates, increased ED stays and other complications of pre-hospital IV access, I would want to avoid this risk.
3. The hospital might need an IV. (Let's apply the JAY tool)
1. JUSTIFIABLE:
 1. There is no written direction from clinical and medical programs or the receiving hospital to have a pre-hospital IV in place.
 2. ACCOUNTABLE:
 1. The practitioner who places the pre hospital IV catheter is responsible for any adverse events that may happen if treatment is not justifiable.
 3. YOU:
 1. If I were the patient, and knowing the evidence, I would not want a pre-hospital IV insertion done if the paramedic was not going to utilize it.

Notes

The risks or adverse events which can occur with out of hospital IV access include:

- Pain/anxiety
- Infection
- Infiltration
- Hematoma
- Air embolism
- Catheter tip or thromboembolism
- Phlebitis

Resources

What questions do we need to ask ourselves to help us make an ethical and clinical appropriate decision? The criteria can be found in the BCEHS Ethics Framework Manual.

Paramedics can also utilize the "JAY" tool to evaluate the risk versus benefit of pre-hospital IV access

PR27: iGel Pharyngeal Suctioning

Applicable To

- PCP and higher

Introduction

The seal of an iGel supraglottic airway may be affected by passive gastric secretions or the undetected accumulation of emesis during resuscitation. Because primary care paramedics are not authorized to perform gastric intubation, a modified approach is required to provide on-going suctioning of the pharynx to ensure an effective seal.

Indications

- Significant suctioning of emesis or gastric secretions was required prior to iGel placement
- Known or suspected presence of gastric secretions following placement of iGel
- Persistent difficult ventilation despite best efforts to manipulate the iGel

Contraindications

- Active vomiting with iGel in place, or difficulty in ventilating following an episode of active vomiting. The iGel should be removed in these cases; suction the oropharynx and replace the device as required.

Procedure

1. Ensure the iGel is appropriately sized and inserted in accordance with [PR08: Supraglottic Airway](#)
2. Secure the iGel using the included neoprene strap or Thomas tube holder
3. Unravel the suction catheter included with the Resus Pack, ensuring there are no significant kinks
4. Using the flat (label) side of the clear plastic outer iGel as a measuring guide, straighten the suction catheter, and measure along the length of the package with the distal tip of the suction catheter on one edge
5. Add approximately 2 cm to this length, and apply tape around the suction catheter to mark the depth
6. Apply lubricant (Muko gel) over the proximal end of the gastric channel of the iGel
7. Insert the suction catheter through the lubricant and into the gastric channel of the iGel, until the taped depth indicator reaches the outer edge of the channel. Do not advance any further.
8. Attach the suction catheter to the suction tubing using the connector
9. Apply suction and watch for the presence of fluid.
10. Once fluid has been cleared, or if no fluid appears after 15-20 seconds, turn the suction unit off (but leave the tubing attached). Continuous suction is not appropriate, and may be harmful.
11. If additional secretions are suspected, or the iGel seal becomes impaired, repeat suction as required.

Caution:

- Ensure the airway is appropriately decontaminated prior to placing the iGel
- Consider other causes of difficult ventilation (e.g., improper device size, incorrect depth, lack of posterior/inferior pressure, or airway obstruction) prior to attempting pharyngeal suctioning
- If the iGel becomes dislodged with a suction catheter in place, do not attempt to re-insert the iGel with the suction catheter beyond the distal tip of the iGel
- Suction should be applied at 80 mmHg, and not generally exceed 160 mmHg

Resources

PR28: Modified Valsalva

Darrel Hunsbedt

Applicable To

■ ACP and higher

PR29: Mechanical Ventilation

Applicable To

■ CCP only

Introduction

Patients in out-of-hospital settings may benefit from mechanical ventilation. In cases where mechanical ventilation represents a component of a treatment plan (such as hypoxemic respiratory failure secondary to pneumonia), it should be initiated as early as practicable. For other patients requiring mechanical support, the use of a ventilator provides consistent ventilation, allows close monitoring of ventilatory parameters, and frees paramedics from the need to ventilate by hand.

Despite these benefits, patients with time-dependent emergencies, such as traumatic injuries, should not have their transport delayed. Paramedics must make the decision to initiate mechanical ventilation based on clinical presentation, anticipated complications, and logistical factors (including availability of assistance and transport time).

Procedure

General approach

1. Determine type of ventilator (LTV 1000 / LTV 1200)
 - PEEP compensated
 - Non-PEEP compensated
2. Connect power source.
3. Assemble ventilator circuit:
 - Circuit
 - $E_t\text{CO}_2$ detector
 - HME filter
 - Tracheal suction
4. Perform initial checks:
 - Start up
 - Leak test

Basic approach to ventilation

1. Select Assist Control -- Volume
2. Select tidal volume (V_T) of 6-8 mL/kg
 - May select higher volumes in patients without lung injury as required.
 - Monitor for elevated Pplats (> 30 cmH₂O).
3. Set respiratory rate:
 - Rate and V_T must provide a minute volume (V_E) that adequately meets the patient's metabolic demands unless a permissive hypercapnia strategy is being used.
 - Monitor for presence of auto-PEEP.
4. Set desired FiO_2 :
 - For patients with any degree of hypoxia, an initial FiO_2 of 1.0 is appropriate.
 - FiO_2 should be titrated down as soon as practical, assuming adequate oxygenation can be maintained in the context of the patient's condition and metabolic demands.
5. Set desired PEEP:
 - Set initial PEEP with consideration of the physiological context. 5-10 cmH₂O is appropriate for most patients.
 - Hypoxemic patients will likely require higher levels of PEEP. Titrate as required.

- Ensure plateau pressures (P_{plat}) are ≤ 30 cmH₂O.
- 6. Set inspiratory time (T_i):
 - Adjust T_i for flows (V_{calc}) of 40-60 liters/minute.
- 7. Set sensitivity to allow for patient-triggered breaths, if desired.
- 8. Set appropriate initial alarm parameters:
 - High pressure limit: 10 cmH₂O above current peak inspiratory pressure (PIP).
 - Low pressure: 5 cmH₂O above set PEEP.
 - Low minute volume: 10-20% below set minute volume.
 - Monitor the patient's vital signs including SpO₂, EtCO₂, vital signs, arterial blood gas, and P_{plat} , and adjust ventilator settings appropriately.
- 9. In case of refractory hypoxia, consider:
 - Increasing PEEP and FiO₂, with due consideration of trans-pulmonary pressures and/or P_{plat} .
 - Performing a recruitment maneuver if indicated (e.g., inspiratory hold at 40 cmH₂O for 40 seconds). Use caution in cases of hemodynamic compromise.
 - Adjusting mode of ventilation.
 - Switching to pressure control ventilation.
 - If changing to pressure control, monitor for auto-PEEP and adjust alarm parameters to appropriate settings:
 - High pressure limit: 10 cmH₂O above set total pressure.
 - Low pressure: 5 cmH₂O above set PEEP.
 - Low minute volume: 10-20% below actual minute volume.
 - Increasing T_i .
 - Inserting an esophageal balloon.
 - Using inverse-ratio ventilation (IRV).

PR30: Out-of-Hospital Blood Administration

Applicable To

- CCP only

Indications

- Traumatic injury and:
 - Early Blood Transfusion Needs (EBTN) score of ≥ 5 ; **or**
 - Active hemorrhage **and** hemoglobin < 70 g/L.
 - Hemoglobin < 90 g/L in patients with symptoms of active acute coronary syndrome.
- Patient age ≥ 12 .

Contraindications

- Refusal of blood product administration.
- Isolated penetrating head injury.

Procedure

1. Complete pre-transfusion bloodwork (group and screen, epoc® BGEM Test Card).
 - If clinically appropriate
2. Consider tranexamic acid.
3. Correct hypothermia.
 - Prevent further heat loss by using warmed IV fluids, chemical blanket, etc.
4. **Consult with EPOS.**
 - If EPOS is unavailable, consider contacting the receiving hospital directly.
 - Blood is not to be transfused without physician consultation.
5. Administer 1-4 units PRBCs to clinical response.
6. Declare **TRANSFUSION** to the receiving emergency department.

Notes

Early Blood Transfusion Needs (EBTN) Score

Risk Factors	Score
Age (years)	
0-55	0
56-70	1
> 70	2
Type of Injury	
Penetrating	2
Non-penetrating	0
Pulse (beats/minute)	
< 60	-4

60 - 119	0
> 120	3
Systolic BP (mmHg)	
< 90	7
> 90	0
Glasgow Coma Scale	
3 - 8	3
9 - 13	1
14 - 15	0

PR31: Mechanical CPR Devices

Applicable To

- ACP and above

