Florida Regional Common

EMS Protocols

Section 4

Procedure Section

Original Publication, February 14, 2012.
Latest Revision, February 2013

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4.1.1 Automated External Defibrillator (AED)

Automated external defibrillators are to be used by the first responder and EMT, when Advanced Life Support providers (e.g., paramedics with monitors/defibrillators) are not available, for treatment of the patient in nontraumatic cardiac arrest. Two types of AEDs are distinguished: fully automatic and semiautomatic.

1. Perform continuous CPR until the AED is applied.
2. Apply the AED pads to the patient according to the manufacturer's recommendation.
3. Activate the unit and follow the AED prompts.
4. If the AED advises to "shock," clear everyone from touching the patient.
5. Push the "shock" button to defibrillate the patient.
6. Immediately resume chest compressions.
7. Analyze per AED prompt after 2 minutes of uninterrupted compressions

4.1.2 Cardiopulmonary Resuscitation (CPR)

Adult

1. Establish unresponsiveness (call for backup as needed).
2. **C**: Assess circulation via carotid pulse (5-10 seconds). If a pulse is absent, start chest compressions (push hard, push fast). Administer compressions at a rate of 100 per minute (place the heel of hand on the sternum between the nipples and compress to a depth of 2 inches).
3. **A**: Open the airway using an appropriate method.
4. **B:** Assess breathing (5-10 seconds). If breathing is absent, give two breaths.
5. Administer 30 compressions and then 2 ventilations
6. If an advanced airway is in place and there are two rescuers, administer continuous compressions and unsynchronized ventilations at a rate of 1 breath every 6 seconds or 1 breath every 10 compressions.
7. Continue compressions and ventilations until the return of a pulse is noted. Intermittently check for the return of a spontaneous pulse.

Child

1. Establish unresponsiveness (call for backup as needed).
2. **C**: Assess circulation via carotid pulse (5-10 seconds). If a pulse is absent, start chest compressions. Administer compressions at a rate of 100 per minute (place the heel of one hand or two hands on the mid sternum and compress at a depth of two inches).
3. **A:** Open the airway using an appropriate method.
4. **B**: Assess breathing (5-10 seconds). If breathing is absent, give two breaths to make the chest rise.
5. For one rescuer, administer 30 compressions and then 2 ventilations; for two rescuers, administer 15 compressions and then 2 ventilations.
6. If an advanced airway is in place and there are two rescuers, administer continuous compressions and unsynchronized ventilations at a rate of 1 breath every 6 seconds or 1 breath every 10 compressions.
7. Continue compressions and ventilations until the return of a pulse is noted. Intermittently check for the return of a spontaneous pulse.

4.1.2 Cardiopulmonary Resuscitation (CPR) (continued)

Infant

1. Establish unresponsiveness (call for backup as needed).
2. C: Assess circulation via brachial pulse (5-10 seconds).
    - For one rescuer, use two fingers on the sternum, one finger width below the nipple line; administer at least 100 compressions per minute, at one-half the depth of the chest.
    - For two rescuers, use two thumbs side by side at the center of breast bone just below the nipple line. Squeeze the infant's posterior chest with the encircled fingers, and administer at least 100 compressions per minute at a depth of 1½ inches of the chest.
3. A: Open the airway using an appropriate method.
4. B: Assess breathing (5-10 seconds). If breathing is absent, give two breaths to make the chest rise.
5. For one rescuer, administer 30 compressions and then 2 ventilations, for two rescuers, administer 15 compressions and then 2 ventilations.
6. If an advanced airway is in place and there are two rescuers, administer continuous compressions and unsynchronized ventilations at a rate of 1 breath every 6 seconds or 1 breath every 10 compressions.
7. Continue compressions and ventilations until the return of a pulse is noted. Intermittently check for the return of a spontaneous pulse.

4.1.3 Basic Life Support – Head-Tilt & Jaw Thrust

4.1.3 Head Tilt – Chin Lift

1. Place one hand on the patient's forehead and push with your palm to tilt the head back.
2. Place the fingers of the other hand under the bony part of the patient's lower jaw near the chin. Do not press deeply into the soft tissue under the chin because it might obstruct the airway.
3. Lift the jaw to bring the chin forward.

4.1.4 Jaw Thrust

1. Place a hand on each side of the patient's face.
2. Grasp the angles of the patient's mandible and lift upward.
3. If there are not enough responders to maintain the jaw thrust or if the jaw thrust is not successful in opening the airway, proceed to the head tilt-chin lift maneuver (Medical Procedure 4.1.3).

4.1.5 Rescue Breathing

One Person

1. Position yourself directly above the patient's head.
2. Place the mask on the patient's face, using the bridge of the nose as a guide for correct positioning.
3. Use the E-C clamp technique to hold the mask in place while you lift the patient's jaw to hold the airway open.
   - Perform a head tilt.
   - Use the thumb and index finger of one hand to make a "C," pressing the edges of the mask to the face.
   - Use the remaining fingers to lift the angles of the jaw (three fingers form an "E") and open the airway.
4. Squeeze the bag to achieve chest rise. The delivery of breaths is the same whether you do or do not use supplementary oxygen.
   For perfusing rhythm:
   - Adult: 10-12 breaths/min.
   - Pediatric: 12-20 breaths/min.

   When CPR is being performed or if an advanced airway is in place:
   - Adult and pediatric: 8-10 breaths/min.
5. Insert an oral or nasal airway.

Two Persons

1. Rescuer one:
   - Take a position directly above the patient's head.
   - Place the mask on the patient's face, using the bridge of the nose as a guide for correct positioning.
   - Use the E-C clamp technique to hold the mask in place with both hands.
   - Use the thumb and index finger of one hand to make a "C," pressing the edges of the mask to the face.
   - Use the remaining three fingers to form an "E" to lift the angles of the jaw.
2. Rescuer two:
   - Squeeze the bag for 1 second, while watching for chest rise.
   - Apply continuous cricoid pressure.
3. Squeeze the bag to achieve chest rise. The delivery of breaths is the same whether you do or do not use supplementary oxygen.

For perfusing rhythm:

- Adult: 10-12 breaths/min.
- Pediatric: 12-20 breaths/min.

When CPR is being performed or if an advanced airway is in place:

- Adult and pediatric: 8-10 breaths/min.

4. Insert an oral or nasal airway

4.1.6 Suspected Foreign Body Airway Obstruction (FBAO)

Adult

1. If the patient is conscious, ask, "Are you choking?"
2. If the patient is unable to speak and/or nods his/her head "yes," give abdominal thrusts, or chest thrusts if the patient is pregnant or obese.
3. Repeat the abdominal thrusts until they are effective or the patient becomes unconscious.

If the patient becomes unconscious, continue with the following steps:

4. Open the airway. If able to visualize the obstruction, perform a finger sweep to remove the object.
5. Attempt to ventilate; if the airway is still obstructed, reposition the airway and try to ventilate again.
6. Give 30 chest compressions.
7. Repeat Steps 4 through 6 until the FBAO is relieved.

Child

1. If the patient is conscious, ask, "Are you choking?"
2. If the patient is unable to speak and/or nods his/her head "yes," give abdominal thrusts.
3. Repeat the abdominal thrusts until they are effective or the patient becomes unconscious.

If the patient becomes unconscious, continue with the following steps:

1. Open the airway. If able to visualize the obstruction, perform a finger sweep to remove the object.
2. Attempt to ventilate; if the airway is still obstructed, reposition the airway and try to ventilate again.
3. Give 30 chest compressions.
4. Repeat Steps 4 through 6 until the FBAO is relieved.

Infant

1. If the patient is conscious, determine airway patency.
2. If the patient is unable to move air or has poor air exchange, give 5 back slaps between the shoulder blades and then 5 chest thrusts with the patient in a head-dependent position.
3. Repeat the back slaps and chest thrusts until they are effective or the patient becomes unconscious.

If the patient becomes unconscious, continue with the following steps:

1. Open the airway. If able to visualize the obstruction, perform a finger sweep to remove the object.
2. Attempt to ventilate; if the airway is still obstructed, reposition the airway and try to ventilate again.
3. Give 30 chest compressions.
4. Repeat Steps 4 through 6 until the FBAO is relieved.

4.2.1 Nasopharyngeal Airway Insertion (NPA)

This procedure should not be performed in the presence of frontal head or midfacial trauma where the cribriform plate may be fractured.

1. Determine the proper size of tube (measure from the nostril to the earlobe).
2. Lubricate with a water-soluble lubricant (optional: lidocaine gel).
3. Position the patient's head in a neutral position, inspect the nose, and select the larger nostril. (Optional: Spray Neo-Synephrine into nasopharynx.)
4. Insert the nasopharyngeal tube with the bevel facing the nasal septum.
5. Gently insert the tube until the flange rests against the nostril.
   - If resistance is met, insert with a twisting motion.
   - If there continues to be resistance, attempt insertion in the other nostril.
6. Ventilation with a bag-valve device.

4.2.2 Oropharyngeal Airway Insertion (OPA)

1. Determine the proper size of tube (measure from the corner of the mouth to the earlobe).
2. Open the patient's mouth by tongue/jaw-lift maneuver.
3. Insert the oropharyngeal tube with the tip toward the side of the mouth.
   - Prior to complete insertion, start to rotate the tube 90 degrees so that the flange rests on the lips.
   - If the patient has an intact gag reflex, perform a nasopharyngeal insertion.
4. Ventilate with a bag-valve device.

4.3 Airway Suctioning – Flexible & Rigid

4.3.1 Flexible Suctioning

1. Wear protective eyewear, gloves, and face mask.
2. Preoxygenate the patient.
3. Turn on the suction unit.
4. Insert the catheter to an appropriate depth, place your thumb over the suction control orifice, and rotate the catheter between your fingertips while withdrawing catheter. (Caution: Do not suction for more than 10 seconds.)
5. Monitor the patient's heart rate, pulse, oxygen saturation, and clinical appearance during suctioning. If bradycardia occurs or the clinical appearance deteriorates, administer high-flow oxygen until the rate and clinical appearance return to normal.
6. Maintain ventilatory support with 100% oxygen

4.3.2 Rigid Suctioning

1. Wear protective eyewear, gloves, and face mask.
2. Preoxygenate the patient.
3. Turn on the suction unit.
4. Measure the depth of catheter insertion from the patient's earlobe to the corner of the mouth.
5. Insert the catheter to an appropriate depth, place your thumb over the suction control orifice, and suction the oropharynx. (Caution: Do not suction for more than 10 seconds.)
6. Monitor the patient's heart rate, pulse, oxygen saturation, and clinical appearance during suctioning. If bradycardia occurs or the clinical appearance deteriorates, administer high-flow oxygen until the rate and clinical appearance return to normal.
7. Maintain ventilatory support with 100% oxygen.

4.4 Advanced Airways – LMA, KingLT and i-gel

For all advanced airways/supraglottics airway devices (SGA)

- Assure a patent airway and ventilate with 100% O_2 before attempting placement of the any advanced airway. Do not hyperventilate the patient
- Monitor SpO_2 with a pulse oximeter and provide 100% O_2 via a BVM
- Select the proper size tube
- Assemble and check the necessary equipment
- Confirm the SGA placement with an end-tidal CO_2 monitoring device and additional confirmation methods such as negative epigastric sounds and positive bilateral breath sounds.
- Secure the SGA with tape or a commercially available device.
- Continually monitor the pulse oximeter and the end-tidal CO2 levels. Provide ventilations at a rate to keep the ETCO2 between 35-45.

4.4.1 Laryngeal Mask Airway (LMA)

1. .Tightly deflate the cuff so that it forms a smooth "spoon shape." Lubricate the posterior surface of the mask with a water-soluble lubricant.
2. Hyperextend the patient's neck (unless cervical spine injury is suspected).
3. Carefully flatten the laryngeal mask tip against the hard palate.
4. Advance the mask until definite resistance is felt at the base of the hypopharynx.
5. Without holding the tube, inflate the cuff to the recommended volume of air for the tube size.

4.4.2 KingLT Airway

1. Lubricate the tip of the tube with a water-soluble gel.
2. Place the patient's head in a neutral position.
3. Apply the tongue/jaw-lift maneuver with one hand while passing the tube with the other hand. Insert the device at a 45- to 90-degree angle, and rotate it to midline as it passes the tongue.
4. Without exerting excessive force, advance the tube until the base of the connector gastric access lumen is aligned with the patient's teeth or gums.
5. Inflate the pharyngeal cuff with the recommended volume of air for the tube size.
6. Ventilate the tube with a BVM while slowly withdrawing the tube in the airway.
   - Initially, little or no air movement will occur
   - Once the tube is withdrawn into the proper space, air will readily pass, and good compliance will be felt. Stop withdrawing at this point.
   - Assess for chest rise, breath sounds and negative epigastric sounds

4.4.3 i-gel Airway

1. Lubricate the back, sides and front of the cuff with a thin layer of water-soluble lubricant (do not use silicone based lubricants).
2. Grasp the i-gel firmly along the integral bite block. Position the device so that the i–gel cuff outlet is facing towards the chin of the patient.
3. The patient should be in the sniffing position with head extended and neck flexed. The chin should be gently pressed down before pro ceding to insert the i-gel.
4. Introduce the leading soft tip into the mouth of the patient in a direction towards the hard palate.
5. Glide the tube downwards and backwards along the hard palate with a continuous but gentle push until a definitive resistance is felt.
6. At this point the tip of the airway should be located into the upper esophageal opening and the cuff should be located against the laryngeal framework.
7. The incisors should be resting on the integral bite-block.

4.4.4 Orotracheal Intubation by Direct Laryngoscopic Visualization

Adult

1. Assure a patent airway and ventilate with 100% O_2 before attempting placement of the airway device. Do not hyperventilate the patient.
2. Assemble and check the necessary equipment.
3. Hyperextend the patient's neck (unless cervical spine injury is suspected).
4. Perform laryngoscopy in less than 30 seconds:
   - Hold the handle in your left hand.
   - Insert the blade from the right side of the patient's mouth.
   - Displace the tongue to the left.
   - Lift the laryngoscope forward to view the glottic opening.
   - Do not use the patient's teeth or lips as a fulcrum.
5. Advance the tube through the glottic opening until the proximal end of the cuff disappears past the vocal cords.
6. If the patient is having difficulty tolerating the intubation attempt, sedate with Versed 0.02 mg/kg IV.
7. Remove the stylet, inflate the cuff with 10 cc of air, and remove the syringe.
8. Hold the tube firmly in place, attach a BVM, and confirm its placement.
9. Auscultate:
   - Negative epigastric sounds.
   - Positive bilateral breath sounds.
10. Attach an end-tidal CO_2 monitoring device.
11. Monitor SpO_2 with a pulse oximeter.
12. After positive confirmation of tube placement, secure it with a commercial device or tape applied to the maxillary region of the face.

Child

1. Assure a patent airway and ventilate with 100% O_2 before attempting placement of the airway device. Do not hyperventilate the patient.
2. Assemble and check the necessary equipment.
   - The endotracheal tube can be sized by several methods, including a weight-based tape or size of the nares or pinky finger.
3. Hyperextend the patient's neck (unless cervical spine injury is suspected).
4. Perform laryngoscopy in less than 30 seconds:
   - Hold the handle in your left hand.
   - Insert the blade from the right side of the patient's mouth.
   - Displace the tongue to the left.
   - Lift the laryngoscope forward to view the glottic opening.
   - Do not use the patient's teeth or lips as a fulcrum.
5. Advance the tube through the glottic opening until the proximal end of the tube disappears past the vocal cords.
6. If the patient is having difficulty tolerating the intubation attempt, sedate with Versed 0.02 mg/kg IV.
7. Remove the stylet.

4.4.4 Orotracheal Intubation by Direct Laryngoscopic Visualization (continued)

8. Hold the tube firmly in place, attach a bag-valve device, and confirm its placement.
9. Auscultate:
   - Negative epigastric sounds.
   - Positive bilateral breath sounds.
10. Attach an end-tidal CO_2 monitoring device.
11. Monitor SpO_2 with a pulse oximeter.
12. After positive confirmation of tube placement, secure it with a commercial device or tape applied to the maxillary region of the face.

4.5.1 Needle Cricothyroidotomy for Pediatrics

1. Hyperextend the patient's neck (unless cervical spine injury is suspected).
2. Locate the cricothyroid membrane between the cricoid and thyroid cartilages by palpating the depression caudal (toward the feet) to the midline Adam's apple.
3. Clean the area well with a Betadine solution or povidone-iodine swabstick.
4. Prepare the necessary equipment:
   - 14-gauge, over-the-catheter needle
   - 10-cc syringe
   - 15-mm adaptor from 3.0 or 3.5 intubation tube
5. Insert the IV catheter through the skin and cricothyroid membrane into the trachea. Direct the needle at a 45-degree angle caudally (toward the feet). When the needle penetrates the trachea, a "pop" will be felt.
6. Aspirate with the syringe. If air is returned easily, the needle is in the trachea.
7. Withdraw the stylet while gently advancing the catheter downward into the position.
8. Attach the 15-mm adaptor to the needle hub.
9. Ventilate the patient with a bag-valve device using the 15-mm adaptor; provide high-flow oxygen.
10. Confirm placement:
    - Negative epigastric sounds.
    - Positive bilateral breath sounds.
11. Attach an end-tidal CO_2 monitoring device.
12. Monitor SpO_2 with a pulse oximeter.
13. Provide 100% O_2 with positive-pressure oxygen or a bag-valve device.
14. Monitor for changes in breathing or airway status.

4.5.2 Surgical Airway (Cricothyroidotomy)

1. If the patient less than 12 years of age, refer to the needle cricothyroidotomy protocol (Medical Procedure 4.5.1).
2. Hyperextend the patient's neck (unless cervical spine injury is suspected).
3. Locate the cricothyroid membrane between the cricoid and thyroid cartilages by palpating the depression caudal (toward the feet) to the midline Adam's apple.
4. Clean the area well with a Betadine solution or povidone-iodine swabstick.
5. Using a scalpel, make a vertical incision through the skin and then a horizontal incision through the cricothyroid membrane.
6. Once the scalpel has passed into the membrane, insert the handle into the opening and twist the handle to open a space between the cricoid and thyroid cartilages. Do not aim the knife cephalad (toward the head), because injury to the vocal cords may occur.
   - It is recommended to use a safety scalpel.

   or
   - A trach hook may also be used.
7. Insert a size 6.0 endotracheal tube or tracheostomy tube through the incision.
8. Inflate the cuff with the recommended amount of air.
9. Ventilate the patient with a bag-valve device using the 15-mm adaptor; provide high-flow oxygen.
10. Confirm placement:
    - Negative epigastric sounds.
    - Positive bilateral breath sounds.
11. Attach an end-tidal CO_2 monitoring device.
12. Monitor SpO_2 with a pulse oximeter.
13. Provide 100% O_2 with positive-pressure oxygen or a bag-valve device.
14. Monitor for changes in breathing or airway status.
15. If necessary, cut several 4 × 4 gauze pads down the middle to the center of the pads. Wrap the pads at the base of the tube and secure them to assist in bleeding control and/or to reduce air escape.

4.6 Autistic Patient

This protocol is intended to assist emergency personnel in dealing with the special challenges that they face when encountering an autistic patient.

Signs of Autism

Many parents are in denial or do not realize the possibility that their child is autistic. It is for this reason that careful consideration should be made before inquiring whether a child is autistic. Doing so may prompt the parent to "shut down" or become defensive, which could hamper the process of acquiring patient information. Signs of autism that the emergency care provider may recognize include these:

- Has not "babbled" or "cooed" by the age of 1 year.
- Has not gestured, pointed, or waved by 1 year.
- Has not spoken a single word by 16 months.
- Has not spoken a two-word phrase by 2 years.

Special Considerations

When dealing with an autistic patient, special accommodations must be made during the encounter to achieve a positive outcome. Conditions that may affect the encounter include these:

- Autistic patients may respond aggressively to an unwanted touch.
- Autistic patients may appear to have a hearing impairment.
  - This may affect your assessment of the patient's level of consciousness and the Glasgow Coma Scale score.
  - It may also prevent the patient from coming to you if called, such as in motor vehicle accidents, fires, and evacuations (a).
- During stressful times, autistic persons may "bolt" or run away from the situation even if they are hurt. These patients will not respond to someone calling their name to stop! This behavior may result in the person running into traffic or other hazardous areas (b).
- Autistic patients cannot tell or describe what is hurt or what they want (c).
- Autistic patients will likely not follow any directions. This will present a great challenge during the patient assessment (c).
- Autistic children do not play with toys appropriately.
- Autistic patients have poor eye contact, which may affect the evaluation of pupils.
  - The autistic patient usually directs his/her eyes up, down, or away. This factor should be considered when head injuries are suspected.
- Autistic patients appear to be in their own world. This could pose a concern if a patient is in danger and is not aware of it (d).
- Autistic patients have odd movement patterns.
  - These movements may include hand flapping, hand washing motions, spinning motions, head slapping, and covering of the ears or eyes
- Autistic patients exhibit an unusual attachment to toys or other objects.
  - To gain the trust of an autistic patient, provide him/her with a favorite object, which may not necessarily be a toy. Ask the parent/caregiver to assist you.

- Autistic patients often demonstrate repetitive behaviors.
  - Autistic persons feel compelled to complete certain tasks, such as lining up their toys.
  - Before allowing an intrusion, such as emergency workers examining them, autistic patients may feel compelled to complete a certain task such as lining up toys, opening a door, or going through a certain routine.
- Autistic patients do not adjust well to a change in their surroundings or routines.
  - These patients are usually set in a certain routine and are extremely comfortable in their known surroundings. Any changes could result in an aggressive response.
- Autistic patients may walk on "tippy toes."
- Autistic patients may have an increased level of pain tolerance.
  - This may be a major consideration during the physical exam. A thorough physical exam is required, especially with suspected abdominal pain, fractures/sprains, and head/neck injuries.
- Autistic patients have an extreme sensitivity to touches and textures (i.e., smooth, rough, sticky, hot/cold, wet/dry).
  - Consideration should be given to this factor when applying dressings and bandages. The simplest of procedures, such as applying a Band-Aid or irrigating a wound, could result in a "meltdown."
- Autistic patients are extremely sensitive to having things on their heads or around their necks.
  - This factor should be considered when applying dressings to head injuries, as well as when utilizing a sling to secure an extremity.

"Meltdowns and Refocus Periods"

Children with autism can have frequent "meltdowns" (tantrums) due to any one of the factors mentioned in the "Special Considerations" section of this protocol. These meltdowns may also occur for no apparent reason and may result in aggressive behavior.

After a meltdown, autistic children will likely go through what is known as a "refocus" period. They will suddenly become quiet; they may crouch down and cover their ears or eyes. Typically they will look for a quiet, darkened, "sheltered" area. During this period, patients are trying to "refocus" their world; this is their time. The refocus period can last a few minutes to possibly 30 minutes or longer. If there is an attempt to rush this period, another meltdown may occur, to be followed by another refocus period; this process could become a vicious cycle.

If you encounter a parent/caregiver who is aware of the autism, ask him/her for advice on how to handle the patient. Parents of autistic children are usually very actively involved with their children and understand their "quirks." Their help should enhance your treatment and be a major factor in lessening the stress level in an already stressful situation.

Note:

(a) Clues that may indicate that you are dealing with an autistic patient may include car magnet "puzzle piece" ribbons on vehicles involved in motor vehicle accidents as well as window stickers on homes indicating the presence of a special needs person.
(b) Autistic patients are not aware of any present dangers. To safely secure the patient, reduce the risk of danger before encountering the patient.
(c) Ask the parent/caregiver to assist you during your interview.
(d) If possible, ask the parent/caregiver to assist with "refocusing" the patient. If such a person is not available, try clapping your hands to get the patient's attention if the situation is urgent. Be aware of a possibly aggressive response to an unwanted touch.

4.7 Blood Alcohol Sampling

Drawing a blood alcohol sample should not delay treatment or transport of the critical patient.

1. The EMS Run Report should contain the following information:
   a. A blood alcohol kit was used.
   b. A Betadine (povidone-iodine) solution (or hydrogen peroxide/acetone if the patient is allergic to iodine) was used for the skin preparation.
   c. Name of the law enforcement officer requesting blood sample.
   d. Time of draw.
   e. If the paramedic drawing sample is different from the one signing the report, that paramedic will sign under the above information.
2. All blood samples taken must be surrendered to the requesting law enforcement officer.
3. The paramedic:
   - May be required to obtain multiple samples.
   - Must follow all blood sampling kit guidelines.
   - Must obtain blood alcohol samples only at the request of a law enforcement officer, either in the field or upon arrival in the emergency department.

4.8.1 Auto-Pulse Chest Compression System

A load-distributing band device is designed to deliver consistent uninterrupted chest compressions during cardiac arrest.

1. Initiate CPR.
2. Maintain high-quality compressions.
3. Power up the Auto-Pulse by pressing the ON/OFF button at the top of the device.
4. Remove the clothing on the patient's torso:
   - Sit the patient up and perform a single cut down the back of the patient's clothing. Then slide the Auto-Pulse platform into position behind the sitting patient, and have the patient lie down on the platform.

   or
   - Log-roll the patient to one side and perform a single cut down the back of the patient's clothing. Then log-roll the patient onto the Auto-Pulse platform.
5. Align the patient on the platform. The patient's armpit should be positioned on the "yellow" indicator line on the Auto-Pulse platform.
6. Close the LifeBand over the patient's chest.
   - Therapy electrodes or defibrillation pads should be in place before applying the LifeBand.
   - Make sure the LifeBand is not twisted.
   - The LifeBand is secure when the mating slot is placed over the alignment tab and the bands are pressed together to engage the Velcro.
   - Center the LifeBand on the patient's chest.
7. Begin compressions by pressing the green Start/Continue button once. The Auto-Pulse device will automatically adjust the bands on the chest.
8. The Auto-Pulse unit will pause for 3 seconds to allow for a check of proper alignment.
   - If patient is not aligned correctly, push the orange Stop/Cancel button.
   - Realign the LifeBand and press the green Start/Continue button.
9. Select the desired mode of compressions by pushing the gray Menu/Mode button.
   - 30:2 mode: 30 compressions and a pause for 2 ventilations.

   or
   - Continuous mode: uninterrupted compressions.
10. Complete the process of securing the patient for transport.
    - Clip the straps for the shoulder restraint to the Auto-Pulse platform and tighten them.
    - Secure the patient's head to the Auto-Pulse platform with the manufacturer's head immobilizer or tape applied across the patient's forehead.
11. After successful resuscitation or termination of activities, press the orange Stop/Cancel button.

4.8.2 LUCAS Chest Compression System

1. Initiate CPR, Maintain high-quality compressions.
2. Open the LUCAS carrying bag to expose the unit.
3. Make certain the On/Off knob is in the "adjust" position.
4. Connect the high-pressure air line to the regulator on the air source.
5. Take the back plate out of the bag. With one rescuer on each side of patient, grab the patient's arm to lift the upper body. One person should lift the patient and support the head, and the other person should lift the patient and slide the back plate below the armpits.
6. Continue manual compressions.
7. Take the upper part of the LUCAS unit out of the bag. Hold the LUCAS device by the handles on the support legs and make sure the support legs have reached their outer position.
8. Pull up once on the release rings to check that the claw locks are open.
9. Interrupt manual chest compressions and place the upper part of the LUCAS unit over the patient's chest. The claw locks at the end of each support leg should be aligned with the back plate to lock the components together.
10. Check by pulling upward that both support legs are locked into the back plate.
11. Lower the suction cup with the height adjustment handles until the pressure pad inside the suction cup touches the patient's chest without compressing the chest.
12. Turn the ON/OFF knob to activate the chest compressions.
13. Attach the neck pad by raising the patient's head slightly. Clip the pad into each buckle attached to the support arms. Pull the excess slack out of each strap by pulling gently and simultaneously until the pad positions itself into place.
14. Attach the wrist straps to each of the patient's wrists to assist with securing the arms during movement/transportation. Use caution to determine that the intravenous site is not compromised due to a slight bend that will occur in the patient's arm. If this does occur, release the arm and secure the unit by other means.
15. After successful resuscitation or termination of activities, turn the ON/OFF knob to the "Off" position.

LUCAS 2 Chest Compression System

1. Initiate CPR, Maintain high-quality compressions.
2. Pull red handle on bag to open
3. To activate, push ON/OFF button for one second to start self-test and power up
4. The green LED adjacent to ADJUST illuminates
5. Take the back plate out of the bag. Pause manual CPR. With one rescuer on each side of patient, grab the patient's arm to lift the upper body. One person should lift the patient and support the head, and the other person should lift the patient and slide the back plate below the armpits.
6. Continue manual compressions.
7. Take the upper part of the LUCAS 2 unit out of the bag. Hold the LUCAS 2 device by the handles on the support legs and make sure the support legs have reached their outer position.
8. Check that the release rings on claw locks are open.
9. Interrupt manual chest compressions and place the upper part of the LUCAS 2 unit over the patient's chest. The claw locks at the end of each support leg should be aligned with the back plate to lock the components together. Listen for the CLICK when attached.

4.8.3 LUCAS Chest Compression System

10. Check by pulling upward that both support legs are locked into the back plate.
11. Center the suction cup over the chest with the lower edge of the suction cup placed immediately above the end of the sternum
12. Push the suction cup down using two fingers, making sure you are in the ADJUST MODE and the green led is lit
13. The pressure pad should touch the patient's chest. If pad does not touch or Lucas 2 does not fit properly, remove and continue manual compressions
14. Press PAUSE to lock the start position then remove your fingers from the suction cup
15. Check for proper position and press ACTIVE (continuous) or ACTIVE (30:2)
16. Attach stabilization strap by fully extending the buckles and placing cushion under patient's neck
17. Fasten cushion to Lucas 2 device and tighten the straps
18. Delay the application of the stabilization strap when it might prevent or delay treatment
19. Attach the wrist straps to each of the patient's wrists to assist with securing the arms during movement/transportation. Use caution to determine that the intravenous site is not compromised due to a slight bend that will occur in the patient's arm. If this does occur, release the arm and secure the unit by other means.
20. Press PAUSE to stop compressions during ECG analysis
21. Keep interruptions to a minimum
22. After successful resuscitation or termination of activities, Press and hold the ON/OFF button for one second.

4.9 Chest Decompression

1. Assess the patient to make sure that his/her condition is due to a tension pneumothorax:
   - Absent or decreased breath sounds on the affected side.
   - Poor ventilation despite an open airway.
   - Tracheal deviation away from the side of the injury (may not always be present).
   - Neck vein distention (may not be present if there is associated severe hemorrhage).
   - Tympany (hyperresonance) to percussion on the affected side.
   - Shock.
   - Decreased SpO_2/end-tidal CO_2.
2. Provide the patient with high-flow oxygen and ventilatory assistance.
3. Identify the second or third intercostal space (i.e., the space between the second and third ribs or between the third and fourth ribs) in the midclavicular line on the same side as the tension pneumothorax.
4. Quickly prepare the area with povidone-iodine.

5a. Make a one-way valve on a 14-gauge, 3- to 3½-inch IV catheter by inserting the IV catheter through the finger of a sterile glove that has been moistened with sterile water.

or

5b. Use a commercial decompression device.

6. (Optional) Attach the IV catheter to a syringe half-filled with saline to aid in visualizing air release.
7. Insert the catheter into the intercostal space.
8. Insert the catheter through the parietal pleura until air escapes. It should exit under pressure.
9. Remove the needle and/or syringe. Leave the plastic catheter in place until it is replaced by a chest tube at the hospital.
10. Monitor the patient, as the initial catheter may clog or kink, requiring reinsertion of another needle.

4.10 CO_2 Monitoring Devices

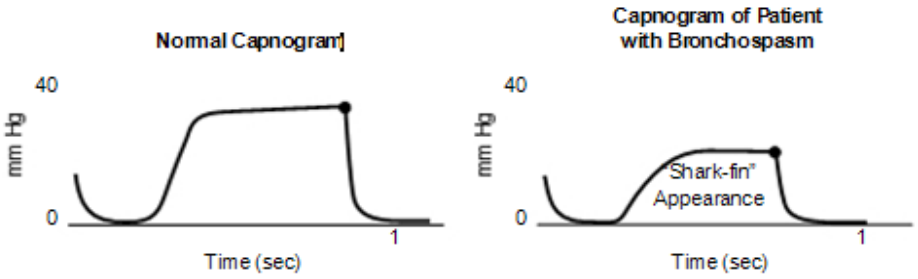
4.10.1 Electronic Waveform CO_2 Detection

Intubated/Supraglottic Device

1. Follow the manufacturer's recommendation for inserting the airway device.
2. Verify placement of the airway device.
3. Attach the CO_2 detection tubing to the airway device.
4. Monitor the electronic readings.

Non-intubated Device

1. Select the appropriate size of detection tubing.
2. Place the detection tubing on the patient.
3. Attach the detection tubing to the CO_2 detection device.
4. Monitor the electronic readings.



Capnography Waveform.

4.10.2 Color Metric End-Tidal CO_2 Detector

1. Remove the detector from the package and match the initial color of the indicator to the purple color labeled "CHECK" on the product dome.
   - The color should be the same or darker.
   - If the color is lighter, do not use the unit.
   - Use an appropriate CO_2 indicator based on the patient's weight.
2. After the tube is inserted, firmly attach the EASY CAP detector between the tube and the breathing device.
3. Ventilate the patient with 6 breaths of moderate tidal volume. Interpreting results with fewer than 6 breaths can yield false results.
4. Compare the color of the indicator on full end-expiration to the color chart on the product dome. (The chemical indicator may become irreversibly yellow after contact with any liquid.)
   - If the color indicator is "yellow," the ETT is in the trachea.
   - If the color indicator is "tan," ventilate six more times and recheck.
   - If the color indicator is "purple," recheck ETT placement with direct laryngoscopy to confirm placement.
5. If the results are not conclusive, the tube should be immediately removed unless correct anatomic placement can be confirmed with certainty by other means.

4.11 CO Monitoring (Rad-57) Carboxyhemoglobin

1. Press the green power button to activate the unit.
2. Place the sensor on the patient's finger (observe the top and bottom of the sensor). Do not place the sensor on the thumb or fifth digit (pinky). If available, utilized the pediatric sensor as instructed by the manufacturer.
3. Four green LED lights below the power button indicate the battery level.
4. The sensor is calibrated to penetrate the mid-nail area, not the cuticle area. Do not force the patient's finger in too far.
5. RAD-57 will calibrate on the patient in 5-8 seconds.
6. Displays will come up in pulse oximeter (SpO_2) mode.
7. The PI graph will display perfusion strength.
8. The display will show "SEN OFF" until the sensor is on the finger.
9. Press the orange "SpCO" button.
10. The display will show the SpCO level from 1% to 99%.
11. Record the level(s) on the patient report.
12. Press and hold the green power button to turn the unit off.

CO Level: Signs and Symptoms

Level	Signs and Symptoms
0-4	Minor headache
5-9	Headache
10-19	Dyspnea, headache
20-29	Headache, nausea, dizziness
30-39	Severe headache, vomiting, altered LOC
40-49	Confusion, syncope, tachycardia
50-59	Seizures, shock, apnea, coma
60-Up	Coma, death

4. 12 CPAP

4.12.1 CPAP (Whisper Flow Fixed-Flow O_2 Generator)

1. Place the patient in an upright or high Fowler's position.
2. Assess vital signs.
3. Attach a cardiac monitor, pulse oximeter, and capnography.
4. Select a sealing face mask and ensure that the mask fits comfortably. The mask should form a seal with the bridge of the patient's nose and fully cover the nose and mouth.
5. Connect the generator to a 50-psi oxygen outlet.
6. Hold the mask or have the patient hold the mask to his/her face. If the patient seems anxious, it is acceptable to turn the generator "on" and have the gas flowing before placing the mask on the patient's face. When the patient is comfortable, use the head strap to hold the mask in place. Ensure it is not too tight. Some air leakage is acceptable, unless it is in the eye area.
7. Choose the appropriate PEEP valve 5-10 cm H_2O.
8. Treatment should be given continuously throughout transport.
9. Evaluate vital signs every 5 minutes.
10. In case of a life-threatening complication, stop treatment and consider the need for intubation.

4.12.2 CPAP (FlowSafe II)

1. Place the patient in an upright or high Fowler's position.
2. Assess vital signs.
3. Attach a cardiac monitor, pulse oximeter, and capnography.
4. Connect oxygen tubing to gas source
5. Secure the face mask snugly to patient's face using the head harness. The mask should form a seal with the bridge of the patient's nose and fully cover the nose and mouth.
6. Slowly increase gas flow to 6 to 8 LPM.
7. Check mask fit to patient and device connections for leaks.
8. Adjust the flowmeter until desired pressure is obtained. Flow of 12-14 LPM is required to reach CPAP pressure of 8.5-10 cm H2O, do not exceed 30 LPM.
9. Treatment should be given continuously throughout transport.
10. Evaluate vital signs every 5 minutes.
11. In case of a life-threatening complication, stop treatment and consider the need for intubation.

4.13 Cyanokit (Hydroxycarbolomin for Injection)

This kit is for intravenous use. The hydroxycarbolomin is to be reconstituted with 100 mL per vial of 0.9% sodium chloride injection. The starting dose is 5 g. (may be packaged in one or two vials).

1. Start a dedicated IV line
2. Reconstitution: Add 100 mL of 0.9% sodium chloride injection to the vial using a transfer spike. Fill to the line (with the vial in an upright position).
3. Mix: Rock or rotate the vial for 30 seconds to mix the solution. Do not shake.
4. Infuse the first vial: Use vented IV tubing to hang the bag and infuse over 7.5 minutes.
5. Infuse the second vial: Repeat Steps 1 and 2 before the second infusion. Use vented IV tubing to hang the bag and infuse over 7.5 minutes.

See Drug Summary 5.19, Hydroxycarbolomin.

4. 14.1 ECG Monitoring/Treatment – 12 Lead Application

4.14.1 12-Lead ECG Application

12-Lead ECG Electrode Placement.

1. RA: right arm, upper arm, or upper chest near the shoulder.
2. LA: left arm, upper arm, or upper chest near the shoulder.
3. RL: right leg or lower abdominal quadrant near the hip.
4. LL: upper leg or lower abdominal quadrant near the hip.
5. V1: fourth intercostal space, immediately to the right of the sternum.
6. V2: fourth intercostal space, immediately to the left of the sternum.
7. V4: fifth intercostal space in the midclavicular line. (Note: V4 must be placed prior to V3.)
8. V3: placed between V2 and V4.
9. V5: fifth intercostal space in the anterior axillary line.
10. V6: fifth intercostal space in the midaxillary line.

4.14.2 External Pacemaker

Several different external pacers are available. While their control panels may look different, all of them have several features in common.

1. Turn on the device.
2. Attach an ECG monitor and therapy electrodes and cables.
   - Place electrodes over the heart on the anterior and posterior locations.

   or
   - Place one electrode in the upper right torso (lateral to the sternum and below the clavicle). Place the other electrode in the left upper midaxillary area (lateral to patient's left nipple).
3. Evaluate the patient:
   - Medication patches: Remove the patches.
   - Patient located on wet surface: Relocate the patient to a dry area.
   - Patient with fluid on chest or back area: Dry with a towel.
4. Record a strip of the patient's rhythm prior to initiating pacing.
5. Consider sedation for conscious patients.
6. Set the unit to pacer mode.
7. Set the heart rate at 70 or 80 beats per minute.
8. Increase the energy setting until electrical capture is achieved (evidenced by a pacer spike followed by a wide QRS complex).
9. Evaluate pacing effectiveness and perform one of the following options:
   - Electrical capture is achieved: Check pulse and blood pressure (right carotid, right femoral, or either brachial pulse due to muscle twitching).

   or
   - Electrical capture is achieved but no pulse: Treat with the Asystole/PEA protocol.

   or
   - No electrical capture: Increase pacer to maximum energy setting and recheck all settings, cables, battery charge, electrode placement, and patient's own rhythm.
10. ECG rhythm strips should be recorded and retained for documentation.
11. Continue all other supportive measures. (There is no risk of electrical shock from touching the patient or from performing other procedures during pacing.)

4. 15 Eye Washing for Chemical and Small Foreign body

4.15 Eye Washing for Chemical and Small Foreign body

1. Remove the patient from the contaminated area.
2. Attempt to identify the chemical and notify the receiving facility.
3. Remove the patient's clothing (if necessary) and decontaminate with copious amounts of water.
4. Remove contact lenses (if present) to ensure that chemicals are not trapped under the lenses.
5. To ensure adequate rinsing behind the eyelid, hold the lid with your thumb and index finger, as it is normal for the eye to close when splashed.
6. Flush the eye away from the nose to avoid contamination of the other eye for a minimum of 20 minutes. Do not delay transport to complete the irrigation process.
7. Use any of these methods:
   - Flush using a faucet spray from a sink or shower.
   - Flush using a bottle of normal saline or sterile water.
   - Flush using a basin filled with water.
   - Flush using nasal cannula tubing.

4.16 Helmet/Face Mask Removal

4.16.1 Football Helmet Face Mask Removal

1. Apply manual in-line stabilization.
2. Employ any of these face mask removal methods:
   - Use a cordless screwdriver to remove the screws attaching the face mask to the helmet.

   or
   - Use a face mask extractor or other cutting device to cut the face mask straps.
3. Secure the patient to a long spine board.
4. Perform cervical immobilization.
   - Apply towel rolls on each side of the helmet and tape the helmet to the long spine board.

   or
   - Use a commercial cervical immobilization device.

4.16.2 Full Face Mask Helmet Removal

1. Apply manual in-line stabilization by placing your hands on each side of the helmet, with your fingers on the patient's mandible.
2. Cut or disconnect the chin straps.
3. Transfer manual in-line stabilization to the second rescuer by placing one hand on the patient's mandible (thumb on one side and fingers on the other side) and the other hand under the patient's head at the occipital area.
4. Inspect the patient for glasses; remove them, if present.
5. Laterally move the helmet to clear the patient's ears.
6. Tilt the helmet backward to raise over the patient's nose and remove it.
7. Apply a cervical collar.
8. Secure the patient to a long spine board.

4.16.3 Football Helmet Removal

1. Apply manual in-line stabilization.
2. Consider completely removing the helmet in the following circumstances:
   - The face mask cannot be removed after a reasonable period of time to access the patient's airway.
   - The helmet chin strap does not hold the patient's head securely.
   - The helmet prevents immobilization during transport.
3. Cut or disconnect the chin straps.
4. Transfer manual in-line stabilization to the second rescuer by placing one hand on the patient's mandible (thumb on one side and fingers on the other side) and the other hand under the patient's head at the occipital area.
5. Laterally move the helmet to clear the patient's ears.
6. Tilt the helmet backward to raise it over the patient's nose and remove it.
7. Apply a cervical collar.
8. If the patient has a chest pad on, it is important to apply padding under the head so the cervical spine is maintained in a neutral position on the spinal board.
9. Secure the patient to a long spine board.
10. Perform cervical immobilization with a commercial cervical immobilization device.

4.16 Helmet/Face Mask Removal

4.16.4 Other Helmets

In the absence of off-setting padding such as football shoulder pads, all other helmets should be removed. Failure to do so will result in compromising the neutral alignment of the spine.
Helmets that should be removed include:

1. Motorcycle helmets
2. Bicycle helmets
3. Skateboard/Ski helmets
4. Roller blading helmets

Steps for Helmet Removal

1. Stabilize the helmet in the neutral in-line position and have a second individual remove the chin strap.
2. The individual that removed the chin strap will then support the occiput and mandible while the helmet is gently slipped up and forward.
3. Once the helmet is removed, standard c-spine control will take place and an appropriate sized cervical collar applied.

Note: If the helmet is too snug or you encounter significant resistance during the removal attempt, then leave the helmet in place and pad the body. Make sure you can access the airway.

Always check the helmet for damage to help assess mechanism of injury. Transport the helmet with the patient if possible.

4.17 Glucometer

The glucometer is designed to be used to test capillary blood for the level of glucose. Several types of glucometers are available. The paramedic should refer to the user's manual for his/her specific type for further information.

1. Select a sample site on the patient's finger and clean the area with an alcohol swab. Allow the alcohol to dry before sticking the finger for a sample.
2. Tear off a single test strip packet. Note the expiration date on the packet. Open the packet and fold back the foil ends to expose the meter end of the test strip.
3. Hold the test end of the test strip between the foil. Insert the test strip fully into the test slot located on the side of the meter; continue the insertion until a confirmation tone is heard.
4. Stick the patient's finger with a lancing device and press the finger to form a small drop of blood. If blood does not readily form on the surface of the patient's skin, have the patient lower his/her hand below the level of the heart to aid in this process.
5. Apply the drop of blood to the test strip.
6. Dispose of the sharp in a biohazard puncture-resistant container.
7. Following a brief delay, the blood glucose result appears in the display.
8. Remove and dispose of the test strip in biohazard garbage bag.

4.18 Medication Administration - Auto-injectors

Auto-injectors

4.18.1 Auto-Injector EpiPen®

The EMT (or paramedic) may administer prescribed epinephrine via an auto-injector for patients who are exhibiting signs of respiratory distress associated with allergic reaction. These signs may include dyspnea, hives, flushing of the skin, wheezing, edema, and possibly unstable vital signs.

1. Assure the auto-injector is prescribed for the patient: EpiPen® for adult patient and EpiPen Jr.® for pediatric patient.
2. Check the expiration date.
3. Remove the auto-injector's safety cap.
4. Grasp the unit like a pen and position the tip of the EpiPen on the outer thigh mid-way between waist and knee.
5. Push the auto-injector firmly against the site until the injector is activated.
6. Hold the auto-injector in place until the medication is fully injected (minimum of 10 seconds).
7. Record the time.
8. Dispose of the auto-injector in a biohazard puncture-resistant container.
9. Reassess the patient.

4.18.2 Auto-Injector DuoDote (source DuoDote.com)

The DuoDote contains 2.1mg of atropine and 600 mg of pralidoxime chloride for use in nerve agent & insecticide poisoning.

Before injecting

1. Tear open the plastic pouch at any of the notches. Remove the DuoDote auto-injector from its protective pouch.
2. Place the DuoDote in your dominant hand. Firmly grasp the center of the DuoDote with the green tip (needle end) pointing down.
3. With your other hand, remove the gray safety release. The DuoDote auto-injector is now ready to be administered.

Select Site & Inject

4. The injection site is the mid-outer thigh area. The DuoDote can inject through clothing. However, make sure pockets at the injection site are empty.
5. Swing and firmly push the green tip against the mid-outer thigh; it should be at a 90 degree angle to the thigh. Continue to firmly push until you feel the DuoDote trigger and begin injecting the antidote. IMPORTANT: After the auto-injector triggers, hold the DuoDote in place against the injection site for approximately 10 seconds.

After Injecting

6. Remove the DuoDote from the thigh and look at the green tip. If the needle is visible, the drug has been administered. If the needle is not visible, check to be sure the grey safety release has been removed and repeat the previous steps beginning with Step 4, but push harder in Step 5.
7. After the drug has been administered, dispose of the unit in a biohazard puncture-resistant container. If biohazard container is not available push the needle against a hard surface to bend the needle back against the auto-injector.
8. Reassess the patient, immediately move yourself and the patient away from the contaminated area and seek definitive care for the patient.

4.18.3 Intramuscular Injection (IM)

1. Prepare the equipment. The needle size should be 21-23 gauge and 1-1.5 inches long.
2. Check for proper medication, expiration date, vial integrity, and color and clarity. Draw the medication into the syringe.
3. Cleanse the injection site with alcohol or Betadine in an expanding circular pattern using a firm pressure.
4. With one hand, pull the skin taut and insert the needle at a 90-degree angle into the muscle.
5. Aspirate to ensure that a blood vessel has not been entered. If blood is aspirated, remove the needle and repeat the procedure at a different site.
6. Administer the appropriate dose.
7. Remove the needle from the injection site and dispose of it in a secure sharps container.
8. Monitor the patient.

4.18.4 Intranasal Medication Administration (IN) Mucosal Atomization Device (MAD)

Damaged nasal mucosa may inhibit absorption of the medication. For this reason, contraindications for a MAD include the following conditions:

- Facial trauma.
- Epistaxis (nose bleed).
- Nasal congestion or discharge.
- Any recognized nasal mucosal abnormality.

1. Prepare the equipment.
2. Check the medication for proper name, expiration date, vial integrity, and color and clarity.
3. Draw the medication into the syringe.
   - Maximum adult and pediatric administration is 1 mL per nostril. The medication should be split with ½ of the dose given in one nostril and the other ½ given in the other nostril.
4. Expel all of the air from the syringe.
5. Securely attach the mucosal atomizer to the syringe.
6. The patient should be in a recumbent or supine position. If the patient is sitting, compress the nares after administration.
7. Briskly compress the syringe plunger to properly atomize the medication.
8. Monitor the patient.

4.18.5 Medication Administration – IO (BIG)

Intraosseous (IO)

4.18.5 BIG (Bone Injection Gun)

Adult

1. Find and mark a penetration site located 2 cm medially and 1 cm proximally to the tibial tuberosity.
2. Clean the area with a povidone-iodine swab.
3. Position the BIG device with one hand to the site and pull out the safety latch with the other hand.
4. Trigger the BIG at a 90-degree angle to the surface.
5. Remove the BIG handle.
6. Pull out the stylet trocar.
7. Fix the cannula with the safety latch.
8. Attach a 10-cc syringe filled with ½ normal saline.
   - Aspirate for bone marrow, then flush with fluid.
   - Observe for any signs of infiltration.
9. If the route is patent, connect it to the drip set tubing.
10. Attach a pressure infuser.
11. Secure the site.

Child

1. Find and mark a penetration site located 1 cm medially and 1 cm proximally to the tibial tuberosity.
2. Clean the area with a povidone-iodine swab.
3. Position the BIG device with one hand to the site and pull out the safety latch with the other hand.
4. Trigger the BIG at a 90-degree angle to the surface.
5. Remove the BIG handle.
6. Pull out the stylet trocar.
7. Fix the cannula with the safety latch.
8. Attach a 10-cc syringe filled with ½ normal saline.
   - Aspirate for bone marrow, then flush with fluid.
   - Observe for any signs of infiltration.
9. If the route is patent, connect it to the drip set tubing.
10. Attach a pressure infuser.
11. Secure the site.

4.18.6 Medication Administration – IO (Cook)

Intraosseous (IO)

4.18.6 Cook Pediatric IO

1. Locate the site of cannulation. Palpate the tibial tuberosity, and move 1-3 cm below the tuberosity on the medial surface of the tibia, approximately one finger's 2width below the tuberosity.
2. Prep the area with antiseptic solution (e.g., povidone-iodine).
3. Grasp the patient's thigh and knee above and lateral to the insertion site palm of the nondominant hand. Wrap your fingers and thumb around the knee to stabilize the proximal tibia. Do not let any portion of your hand rest behind the insertion site.
4. Palpate the landmarks again to confirm the insertion site.
5. Insert the needle through the skin, over the flat anteromedial surface of the tibia.
6. Advance the needle through the bony cortex of the proximal tibia, directing the needle perpendicular (90 degrees) to the long axis of the bone or slightly caudad (toward the toes) to avoid the epiphysial plate, using a gentle back-and-forth twisting or drilling motion.
7. Stop advancing the needle when a sudden decrease in resistance to forward motion of the needle is felt.
8. Unscrew the cap and remove the stylet from the needle.
9. Stabilize the needle and attach a 10-mL syringe filled with normal saline.
10. Aspirate for bone marrow, then flush the needle with normal saline. Check for any signs of increased resistance to injection or swelling of the surrounding tissue.
11. If the test injection is successful, remove syringe and connect the IV tubing.
12. Attach a pressure infuser.
13. Secure the site.

4.18.7 Medication Administration – IO (EZ IO)

Intraosseous (IO)

4.18.7 EZ IO

1. Locate an insertion site:
   - **Proximal Tibia**
     The **proximal tibia** insertion site is approximately 2 cm below the patella and approximately 2 cm medial to the tibial tuberosity (depending on patient anatomy).
   - **Proximal Humerus – permitted in pediatrics when landmarks are clearly identified**
     The **proximal humerus** insertion site is located directly on the most prominent aspect of the greater tubercle. Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted (close to the body). Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1 cm (depending on patient anatomy) above the surgical neck is the insertion site. This is the preferred site for patients who are responsive to pain. Once the insertion is completed secure the arm in place to prevent movement and accidental dislodgement of the IO catheter.
   - **Distal Tibia** - The distal tibia insertion site is located approximately 3 cm proximal to the most prominent aspect of the medial malleolus (depending on patient anatomy). Place one finger directly over the medial malleolus; move approximately 3 cm proximal and palpate the anterior and posterior borders of the tibia to assure that your insertion site is on the flat center aspect of the bone.
   2. Clean the area with a povidone-iodine swab.
3. Select the appropriate needle.
   - Small (pink) 15mm needle: weight = 3-39 kg
   - Medium (blue) 25mm needle: weight ≥ 40 kg
   - Large (yellow) 45mm needle: weight > 40 kg and patients with excessive tissue over insertion sites
4. Remove the needle from the case. Push the needle onto the power driver, and make sure that it is securely seated.
5. Remove and discard the needle set safety cap from the needle.
6. Insert the EZ-IO needle onto the tibial site at a 90-degree angle to the bone surface.
7. Gently power the needle set until it touches bone, and then apply steady down- ward pressure.
8. Release the driver's trigger until:
   - There is a sudden "give" or "pop."

   or
   - The needle reaches the desired depth at 5 mm, which is indicated on the needle by the black line.
9. Remove the power driver and needle stylet.
10. Confirm that the catheter is stable.
11. Take the syringe containing 10 mL of normal saline and attach the EZ-IO catheter luer lock.
12. Use 5 mL of normal saline to flush the EZ-IO catheter luer lock; attach the luer lock to the needle.
13. Pull back on the syringe to aspirate blood, then flush with 5 mL of normal saline.
14. If the route is patent, connect it to the drip set tubing.
15. Attach a pressure infuser.
16. Secure the site and attach the wrist label to the patient's hand.

4.18.8 Intravenous Cannulation

1. Locate a suitable venipuncture site. The back of the hand, forearm, and antecubital fossa are preferred sites. The external jugular vein is acceptable if no other suitable site can be found.
2. Place a constricting band to halt venous return without obstructing arterial flow. Leave one end of the slip knot exposed to assure rapid release when the procedure is complete.
3. Inspect the catheter to be sure that catheter hub and primary push-off tab are fully seated to the needle housing assembly.
4. Locate a suitable vein. Palpate one that is well fixed (not rolling) and that does not have valves (firm nubs of tissue) proximal to the intended site of entry.
5. Cleanse the venipuncture site. Employ alcohol or Betadine in an expanding circular pattern, using a firm pressure.
6. Anchor the vein with gentle skin traction.
7. Hold the needle bevel up and insert catheter at a 30- to 45-degree angle until you feel the needle pop into the vein. Flashback of blood should be observed in the catheter/chamber.
8. At this point, the metal stylet is in the vein, but the catheter is not. Advance the cannula approximately 0.5 cm farther. Holding the metal stylet stationary, slide the catheter over the needle into the vein. Place a finger over the vein at the catheter tip and tamponade the vein to prevent blood from flowing out of the catheter.
9. Remove the tourniquet. Do not reinsert the needle into the catheter at any time.
10. Secure a luer device to the catheter by following the manufacturer's instructions for that device.
11. Secure the catheter with tape or a commercial device.
12. Dispose of the needle in a secure sharps container.

Troubleshooting a Nonflowing IV

- Has the constricting band been removed? This is the most common cause.
- Is there swelling at the cannulation site? This indicates infiltration into the tissues.
- Are the tubing control valves open?
- Does the cannula need to be repositioned because it is up against a valve or wall of the vein? You may have to remove the securing device to check for this condition.
- Is the IV bag hung high enough?
- Is the drip bag completely filled with solution? If it is, turn bag upside down and squeeze the drip chamber to return some of the fluid to the bag.
- Lower the bag below the level of the insertion site. If blood return is seen in the IV site, the site is patent.
- If problems persist, remove the IV and reestablish it at another site.

4.18.9 Medication Administration - Nebulizer

4.18.9 Nebulizer

1. Prepare the equipment for appropriate application:
   - Mask application: mask, mist chamber, oxygen supply tubing, and cylinder.
   - Self-administration application: mouthpiece, mist chamber, oxygen supply tubing, and cylinder.
2. Add medication to the nebulizer mist chamber. Make sure the nebulizer mist chamber cap is tightly secured.
3. Gently swirl the nebulizer to mix the contents.
4. Attach the mouthpiece or mask.
5. Connect the nebulizer to the oxygen tubing and oxygen cylinder.
6. Set the flow:
   - Adult: 6-8 L/min
   - Pediatric: 3 L/min
7. The patient should breathe as calmly, deeply, and evenly as possible until no more mist is formed in the nebulizer chamber (5-15 minutes).

4.19 Morgan Lens

Morgan Lens Insertion

1. Remove the patient's contact lenses, if present.
2. Instill topical local anesthetic (tetracaine HCl 0.5% eye drops) to the affected eye(s).
3. Attach the Morgan lens to IV tubing or Morgan lens delivery set.
4. Prime the tubing and lens with irrigation solution.
5. Have the patient look down; insert the Morgan lens under the upper lid.
6. Have the patient look up; retract the lower lid to drop the lens in place.
7. Release the lower lid over the lens.
8. Adjust the flow to the desired rate.
9. Tape the tubing to the patient's forehead to prevent accidental lens removal.
10. Absorb any outflow with towels.

Removal of Morgan Lens

1. Have the patient look up; retract the lower lid behind the interior border of the lens.
2. Hold this position.
3. Have the patient look down; retract the upper lid and slide the lens out.

4.20 Nitrous Oxide- Nitronox

1. Prepare the equipment. Nitronox units consist of a nitrous oxide cylinder, a blending regulator, an oxygen cylinder, and a mask.
2. Contraindications: altered state of consciousness, COPD, acute pulmonary edema, pneumothorax, decompression sickness, air embolus, pregnancy (except during delivery), abdominal pain with distention or suspicion of obstruction, and inability to self-administer the medication.
3. Turn the oxygen and nitrous oxide cylinder valves to the "on" position. Make sure the device shows appropriate blending of the gases.
4. Attach a mask to the Nitronox unit regulator and provide it to the patient for self-administration. The patient must be able to self-administer the medication; if he/she cannot, Nitronox cannot be used.
5. Monitor the patient's vital signs and pulse oximeter. If the patient's vital signs become unstable or the patient becomes symptomatic from the side effects, discontinue Nitronox.

4.21 Pediatric Length-Based Emergency Tape: Broselow or Handtevy

The pediatric length-based emergency tape is designed to be used as a quick reference for drug dosages and equipment sizing for pediatric patients. The tape is calibrated in different zones according to different lengths. The zone that corresponds to the patient's length is used. If the pediatric length-based emergency bag/box is also used, the zone on the tape can be matched with the zone on the pouch that contains the appropriately sized equipment.

1. Place the patient in a supine position.
2. Remove the tape and unfold it.
3. Place the tape next to the patient, ensuring that the multicolored side faces up.
4. Place the red end of the tape even with the top of the patient's head.
5. Place the edge of one hand on the red end of the tape.
6. Starting from the patient's head, run the edge of your free hand down the tape.
7. Stop your hand even with the heel of the patient's foot. If the patient is larger than the tape, stop here and use the appropriate adult technique.
8. Verbalize the zone on the tape (color and/or age) where your free hand has stopped. If the patient falls on the line, go to the next higher section.
9. Use the medication doses which correspond to the zone selected.
10. Use the corresponding zone (color and/or age) to determine appropriate equipment sizes.

4.22 Physical Restraints

A restraint is defined as any mechanism that physically restricts a person's freedom of movement, physical activity, or normal access to his/her body. Restraints should be used only as a last resort because they have the potential to produce serious consequences, such as physical and psychological harm, loss of dignity, violation of the individual's rights, and even death. Justification for the restraints must be noted in the EMS Run Report.

Restraints should be used only when attempts at pharmacological, verbal, and family intervention have been deemed ineffective and when the patient is:

- Attempting to inflict intentional harm on self or others.
- Attempting to inflict bodily harm on EMS personnel.

Only a commercial soft restraint system should be used.

1. The patient should be placed supine on a long spine board (or backboard). Never place a patient in the prone position.
   - Use of a long spine board provides the flexibility to easily move the patient should he/she vomit.
   - It also provides a safe means of transfer from the stretcher to the bed.
2. Wrap the cuff pad around each limb.
   - Do not cinch the strap tight. You should be able to insert one finger between the limb and the device.
   - Ensure that the device is properly applied per the manufacturer's instructions, as some products can constrict circulation when improperly installed.
3. Secure one of the patient's arms on the upper part of the long spine board and the other arm on the lower part of the long spine board.
4. Secure the patient's ankles to the lower portion of the long spine board.
5. Secure the strap to the long spine board with a quick-release tie.
6. Check for and correct any circulatory, respiratory, or neurological compromise caused by the restraint.
7. Document the time when the restraint is applied.
8. Utilize the strapping mechanisms of the long spine board to provide additional security and support for the patient with moving.
9. Continuously monitor the patient for the following issues:
   - Tightening of the strap around the limb.
   - Changes in mental status.
   - Changes in vital signs.
   - Changes in pulse oximetry.
   - ECG changes.
   - Changes in respiratory effort (positional asphyxia).
   - Vomiting.
   - Signs of circulatory and/or neurological compromise at the site of the restraint.
10. Immediately address any changes in patient status.
11. Document the duration of the restraint.

4.23 Pulse Oximeter

Pulse oximeters are used for the detection of hypoxemia in arterial oxyhemoglobin. Peripheral oxygen is obtained by placing a sensor probe on the peripheral capillary bed.

1. Attach the appropriate sensor to the patient's finger or toe. Remove any nail polish.
2. Turn on the pulse oximeter unit.
3. Evaluate the results:
   - Normal range: oxygen saturation of 92-100%
   - Mild distress: oxygen saturation of 90-92%
   - Moderate distress: oxygen saturation of 80-89%
   - Severe distress: oxygen saturation of less than 80%
4. Oxygenate the patient with the appropriate delivery device based on the reading and the patient's condition.
5. Evaluate the patient for possibly false high readings:
   - Carbon monoxide poisoning: Elevated carboxyhemoglobin can falsely elevate saturation readings because carboxyhemoglobin modulates light similar to oxyhemoglobin as it passes through the tissue.
   - Trauma: Despite a normal saturation level, severe hemorrhage can cause the patient to not have enough blood to perfuse the organs, so that the patient is hypoxic.
6. Evaluate the patient for possibly false low readings:
   - Deeply pigmented patients: may diminish light transmission.
   - Nail polish or fake nails: may diminish light transmission.
   - Patient movement: may cause the pulse oximeter to not register.
   - Low blood flow states: may cause the pulse oximeter to not register.
7. Continuously monitor and document readings.

4. 24.1 Spinal Immobilization – Decision Assessment

4.24.1 Spinal Immobilization Decision Assessment

1. Spinal immobilization is required if any of the following is present in the trauma patient (remember NSAIDS):
   a. Neurological deficit (e.g., focal deficit, tingling, reduced strength, numbness in extremity).
   b. Significant traumatic mechanism and extremes of age.
   c. Altered mental status.
   d. Intoxication or mental impairment.
   e. Distracting, painful injury - other painful injury that may distract the patient from the pain of the c-spine injury.
   f. Spinal exam reveals point tenderness or pain to range of motion of the spinal process (e.g., cervical, thoracic, or lumbar-sacral). This includes any neck pain with or without movement.
2. If all of the above are absent, spinal immobilization is not required.
3. The decision not to implement spinal immobilization is the responsibility of the paramedic.
4. Pearls:
   a. The patient should be oriented to person, place, situation, and time.
   b. Evidence of a significant mechanism of trauma includes a windshield "spider," dash deformity, ejection, rollover, and space invasion > 1 foot.
   c. The patient's range of motion should not be assisted. The patient should touch his/her chin to the chest, extend the neck (look up), and turn side-to-side (shoulder-to-shoulder) without pain.
   d. Major injuries that may distract a patient's awareness to pain include pelvic fracture, femur fracture, extensive burns or soft-tissue injury, acute abdomen, or significant chest injury.

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4.24.2 Spinal Immobilization - Horizontal

4.24.2 Horizontal Spinal Immobilization

1. Manually immobilize the head in a neutral, in-line position. Manual immobilization should be provided without interruption until complete patient immobilization is accomplished.
2. Contraindications to placement in an in-line position:
   - Neck muscle spasm that prohibits neutral alignment.
   - Increased pain.
   - Onset of or increase of a neurological deficit such as numbness, tingling, or loss of motor ability.
   - Compromise of the airway or ventilation.
   - If the patient's injuries are so severe that the head presents with such misalignment that it no longer appears to extend from the midline of the shoulders.
3. Size and apply a cervical collar according to the manufacturer's recommendations.
4. While maintaining manual stabilization with a cervical collar in place:
   - Log-roll the patient.
   - Position the backboard next to the patient so that the head of the backboard is approximately 1-2 feet above the patient's head.
   - Roll the patient onto the backboard in a supine position.
   - Reposition the patient to center him/her on the backboard, by sliding patient in an upward motion (axial) on the board. Do not slide the patient in a direct lateral position, as this may manipulate the spine.
5. Secure the patient's body to the board with straps.
   - Immobilize the upper torso to prevent upward sliding of patient's body during movement and transportation. This is accomplished by bringing the straps over the shoulders and across the chest to make an X.
   - Additional straps must be placed to prevent side-to-side movement of the body on the board. This can be accomplished by placing the straps across the iliac crests and mid-to-distal thigh or at the pelvis with groin loops.
   - Arms should be placed at the patient's side to prevent movement of the shoulder girdle.
6. Secure the patient's head with a cervical immobilization device:
   - Commercially available cervical immobilization device: Follow the manufacturer's recommendation.

     or
   - Towel rolls applied to each side of the head: Secure the towels by placing 1- or 2-inch tape directly across the patient's forehead to the underpart of the backboard. Also secure the towels with tape across the surface of the semi-rigid cervical collar to the underpart of the backboard. Do not apply tape directly under the patient's chin, as this may create an airway obstruction.
7. Pad the space, as needed, between the back of the patient's head and the back-board to prevent hyperextension of the cervical vertebrae.

4.24.3 Spinal Immobilization - Pediatric

4.24.3 Pediatric Spinal Immobilization

1. Manually immobilize the patient's head in a neutral, in-line position. Manual immobilization should be provided without interruption until complete patient immobilization is accomplished.
2. Contraindications to placement in an in-line position:
   - Neck muscle spasm that prohibits neutral alignment.
   - Increased pain.
   - Onset of or increase of a neurological deficit such as numbness, tingling, or loss of motor ability.
   - Compromise of the airway or ventilation.
   - If the patient's injuries are so severe that the head presents with such misalignment that it no longer appears to extend from the midline of the shoulders.
3. Size and apply a cervical collar according to the manufacturer's recommendations.
4. While maintaining manual stabilization with a cervical collar in place:
   - Log-roll the patient.
   - Position the pediatric immobilizer next to the patient so that the head of the immobilizer is approximately 6-12 inches above the patient's head.
   - Roll the patient onto the backboard in a supine position.
   - Reposition the patient to center him/her on the immobilizer, by sliding the patient in an upward motion (axial) on the immobilizer.
   - Do not slide the patient in a direct lateral position, as this may manipulate the spine.
5. Secure the patient's body to the board with straps.
   - Pediatric immobilizers with integrated strapping design: Secure them according to the manufacturer's recommendation.

     or
   - Immobilize the upper torso to prevent upward sliding of the patient's body during movement and transportation. This is accomplished by bringing the straps over the shoulders and across the chest to make an X.
   - Additional straps must be placed to prevent side-to-side movement of the body on the board. This can be accomplished by placing the straps across the iliac crests and mid-to-distal thigh or at the pelvis with groin loops.
6. If the patient is so small that there is a space left between straps and sides of patient, take up space with pads (e.g., blanket, towel).
7. The patient's arms should be placed at his/her side to prevent movement of the shoulder girdle.
8. Secure the patient's head with a cervical immobilization device.
   - Commercially available cervical immobilization device: Follow the manufacturer's recommendation.

     or
   - Towel rolls applied to each side of the head: Secure the towels by placing 1- or 2-inch tape directly across the patient's forehead to the underpart of the backboard. Also secure the towels with tape across the surface of the semi-rigid cervical collar to the underpart of the backboard. Do not apply tape directly under the patient's chin, as this may create an airway obstruction.
9. Pad the space, as needed, between the back of the patient's head and the backboard to prevent hyperextension of the cervical vertebrae.

4.24.4 Spinal Immobilization - Standing

4.24.4 Standing Spinal Immobilization

1. Manually immobilize the patient's head in a neutral, in-line position from the front to eliminate lateral movements. Manual immobilization should be provided without interruption until complete patient immobilization is accomplished.
2. Contraindications to placement in an in-line position:
   - Neck muscle spasm that prohibits neutral alignment.
   - Increased pain.
   - Onset of or increase of a neurological deficit such as numbness, tingling, or loss of motor ability.
   - Compromise of the airway or ventilation.
   - If the patient's injuries are so severe that the head presents with such misalignment that it no longer appears to extend from the midline of the shoulders.
3. Size and apply a cervical collar according to the manufacturer's recommendations.
4. Position the backboard behind the standing patient.
5. Have the rescuer performing manual stabilization of the head from the front of the patient pass off the stabilization to a second rescuer who will perform manual stabilization of the head from behind the patient, with arms on either side of the standing backboard. The third rescuer can hold the backboard in place during this switch.
6. Have two rescuers on either side of the patient grasp the backboard with one hand and the patient's armpit with the other hand.
7. With one rescuer at each side of the backboard and the third rescuer holding the patient's head, slowly lay the board down. A stop approximately halfway down will be needed to allow the rescuer holding the head to reposition his/her hands.
8. Reposition the patient to center him/her on the backboard, by sliding the patient in an upward motion (axial) on the board. Do not slide the patient in a direct lateral position, as this may manipulate the spine.
9. Secure the patient's body to the board with straps.
   - Immobilize the upper torso to prevent upward sliding of patient's body during movement and transportation. This is accomplished by bringing the straps over the shoulders and across the chest to make an X.
   - Additional straps must be placed to prevent side-to-side movement of the patient's body on the board. This can be accomplished by placing the straps across the iliac crests and mid-to-distal thigh or at the pelvis with groin loops.
   - The patient's arms should be placed at his/her side to prevent movement of the shoulder girdle.
10. Secure the patient's head with a cervical immobilization device:
    - Commercially available cervical immobilization device: Follow the manufacturer's recommendation.

      or
    - Towel rolls applied to each side of the head: Secure the towels by applying 1- or 2-inch tape directly across the patient's forehead to the underpart of the backboard. Also secure the towels with tape across the surface of the semi-rigid cervical collar to the underpart of the backboard. Do not apply tape directly under the patient's chin, as this may create an airway obstruction.
11. Pad the space, as needed, between the back of the patient's head and the back-board to prevent hyperextension of the cervical vertebrae.

4.24.5 Vest-Type Extrication Device (KED)

1. Manually immobilize the patient's head in a neutral, in-line position. Manual immobilization should be provided without interruption until complete patient immobilization is accomplished.
2. Contraindications to placement in an in-line position:
   - Neck muscle spasm that prohibits neutral alignment.
   - Increased pain.
   - Onset of or increase of a neurological deficit such as numbness, tingling, or loss of motor ability.
   - Compromise of the airway or ventilation.
   - If the patient's injuries are so severe that the head presents with such misalignment that it no longer appears to extend from the midline of the shoulders.
3. Size and apply a cervical collar according to the manufacturer's recommendations.
4. Insert the device behind the patient. Try to limit the patient's movement while you are positioning the device.
5. Position the device so that it fits securely under the axilla of the patient. Open the side flaps and place them around the patient's torso. Make sure the device is centered on the patient.
6. Position, connect, and adjust the torso straps. Leave the uppermost strap loose until the patient's head is immobilized.
7. Position and fasten each groin loop. Adjust one side at a time to prevent excess movement of the patient.
8. Place the pad behind the patient's head, filling the void to prevent hyperextension.
9. Position the head flaps. Fasten the forehead strap and apply the chin strap over the cervical collar.

4.25 Splinting – Air Splints, Hare Traction & Rigid Splints

4.25.1 Air Splint

1. Expose the injured area.
2. Evaluate the patient's distal pulse, motor function, and sensory function.
3. Align the extremity, stabilize it, and support the extremity.
   - Do not align a joint injury if resistance is met. Use another device instead.
4. Place your arm through the splint and grasp the patient's hand or foot.
5. Apply gentle traction while sliding the splint into position.
6. Inflate the splint to a point that a slight dent can be made into the plastic when pressed with a finger.
7. Reevaluate the patient's distal pulse, motor function, and sensory function.

4.25.2 Hare Traction Splint

1. Expose the injured area.
2. Apply manual traction of the affected leg.
3. Check the patient's distal pulse, motor function, and sensory function.
4. Place the splint next to the uninjured leg. Adjust it to the proper length, from the top of the patient's pelvis to a few inches past the ankle.
5. Attach the ankle hitch about the foot and ankle.
6. Manually apply gentle in-line traction to the ankle hitch.
7. Slide the splint into position under the injured leg.
8. Place the ischial pad against the iliac crest.
9. Fasten the ischial strap.
10. Connect the loops of the ankle hitch to the end of the splint.
11. Tighten the ratchet and release the manual traction. Continue to pull until the patient has relief of pain and muscle spasms.
12. Secure the splint with straps.
13. Reevaluate the patient's distal pulse, motor function, and sensory function

4.25.3 Rigid Splinting

1. Expose the injured area.
2. Evaluate the patient's distal pulse, motor function, and sensory function.
3. Align the extremity, stabilize it, and support the extremity. Do not align a joint injury if resistance is met.
4. Acquire the appropriate-length wood planks. Provide padding to ensure even contact with the splint.
5. Place the wood on each side of the injury.
6. Secure the extremity to the rigid splint with tape, cling, or Ace wraps.
   - Long bone injury: Immobilize the joint above and joint below the injury.
   - Joint injury: Immobilize the bone above and bone below the injury.
7. Reevaluate the patient's distal pulse, motor function, and sensory function.

4.25.4 Sager Traction Splint

1. Expose the injured area.
2. Apply manual traction to the affected leg.
3. Check the patient's distal pulse, motor function, and sensory function.
4. Position the Sager traction splint between the patient's legs.
5. Adjust the splint to a distance slightly past the patient's ankle.
6. Apply the abductor bridle (thigh strap) around the upper thigh of the fractured limb.
7. Push the ischial perineal cushion gently down while pulling the thigh strap snugly.
8. Apply the Malleolar Harness (ankle harness) and attach it to the traction handle.
9. Place one hand on the padded shaft and the other hand on the traction handle while gently extending splint.
10. Pull the traction handle and release the manual traction. Continue to pull until one of the following conditions is met:
    - Maximum of 7 kg (15 lb) for one femur fracture.
    - Maximum of 14 kg for bilateral femur fractures.
    - Patient has relief of pain and muscle spasms.
11. Secure the splint with large elastic leg cravats.
12. Reevaluate the patient's distal pulse, motor function, and sensory function.

4.25.5 Vacuum Splint

1. Expose the injured area.
2. Evaluate the patient's distal pulse, motor function, and sensory function.
3. Align the extremity, stabilize it, and support the extremity. Do not align a joint injury if resistance is met.
4. Wrap and secure the vacuum splint around the extremity.
5. Draw the air out of the splint.
6. Reevaluate the patient's distal pulse, motor function, and sensory function

4.26 Vagal Maneuvers

The degree of stimulation of the vagus nerve affects the heart rate. The greater the degree of vagal stimulation, the more the vagus nerve will slow the heart rate, thereby inhibiting the SA node.

4.26.1 Ice Water Immersion of the Face (Vagal Maneuvers)

1. Attach the patient to an ECG for continuous monitoring.
1. Establish intravenous access.
2. Determine that patient is conscious and cooperative.
3. Note that this procedure is contraindicated for patients with history of acute coronary syndrome, hypertension, and heart transplant.
4. Document the ECG and any dysrhythmia.
5. Describe the procedure to the patient.
   - Fill a large basin or sink with ice water. It must be very cold.
   - Ask the patient to hold his/her breath and put the entire face into the water for several seconds.

   OR
   - Fill a large latex exam glove with ice water.
   - Place the glove on the patient's face for several seconds.
6. Continue to monitor the heart rhythm during the procedure. Stop the procedure if:
   - The patient becomes confused.
   - The heart rate drops below 100 BPM.
   - Asystole occurs.

4.26.2 Valsalva Maneuver (Vagal Maneuvers)

1. Attach the patient to an ECG for continuous monitoring.
2. Establish intravenous access.
3. Determine that the patient is conscious and cooperative.
4. Document the ECG and any dysrhythmia.
5. Describe the procedure to the patient.
   - Have the patient inhale and hold his/her breath.
   - Bear down as if to have a bowel movement.
   - Hold for 20-30 seconds.
   - Try to turn the face red.

   OR
   - Have the patient blow forcefully through a straw or IV catheter for as long as possible.
6. Continue to monitor the heart rhythm during the procedure. Stop the procedure if:
   - The patient becomes confused.
   - The heart rate drops below 100 BPM.
   - Asystole occurs.