Palm Beach County Fire Rescue

Patient Care Protocols

EXCELLENCE TODAY IMPROVING TOMORROW

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- The following Emergency Medical Services Protocols are the official Advanced and Basic Life Support Protocols for Palm Beach County Fire Rescue and are approved for such use by paramedics and EMTs of the department to care for the sick and injured. Paramedics and EMTs working under the license of the Palm Beach County Fire Rescue Medical Director are authorized to utilize these protocols.

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STANDING ORDERS

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INFORMATION

It is recognized that the EMS protocols cannot address every possible scenario. Therefore, EMS Captains and Trauma Hawk personnel are given the authority to deviate from the ALS protocols as needed. Clear documentation of the deviation is required in the ePCR narrative by the EMS Captain or Trauma Hawk personnel. Good judgment and the patient's best interest must be considered at all times.

ADULT & PEDIATRIC

BODY SUBSTANCE ISOLATION

- All personnel are expected to use the appropriate PPE when operating on an emergency scene
  - A minimum of gloves and eye protection should be worn by all personnel who are in direct contact with a patient.
  - Personnel should use appropriate PPE for indirect contact with a patient when appropriate and should default to the most appropriate level of PPE for the incident.
- Droplet Precautions:
  - In addition to gloves and protective eyewear, personnel should consider protective sleeves, masks, respirators, face shields, and gowns when appropriate or as directed.
- Airborne Precautions:
  - Whenever an airborne disease is suspected or known (e.g., meningitis, tuberculosis, etc.) all personnel involved in patient care should wear a NIOSH approved respirator.
  - Place a surgical mask on any patient with suspected aerosolized/airborne disease.
  - **DO NOT** withhold OXYGEN if patient is dyspneic or hypoxic.

MEDICATION ADMINISTRATION

- Prior to administering any medication, inquire about medication allergies or adverse reactions to medications.
- Follow the 6 Rights of drug administration:
  - Drug
  - Dose
  - Time
  - Route
  - Person
  - Documentation
- A true allergy to a medication causes a rash, SOB, and/or swelling of the tongue/face/throat.
- The administering paramedic shall use closed-loop communication with a second paramedic to ensure proper drug, dose, and any contraindications prior to administration.

INTRAVENOUS SITES (IV)

- An IV should be placed for a patient with an emergency medical condition that requires vascular access.
- Always select the appropriate gauge peripheral IV catheter that will accommodate the patient's anatomy and prescribed therapy.
- IV is the preferred route for medication administration, unless otherwise noted in a specific protocol.
- When a fistula is present, an IV should be established in the opposite arm.
- IVs placed below the level of the pelvis should be avoided due to a higher infection rate, poor lower extremity circulation, increased potential for extravasation, and potential for DVT dislodgement.

ALTERNATIVE VENOUS SITES

- Personnel **SHALL NOT** utilize implanted central venous access ports on any patient.
- If a Peripherally Inserted Central Catheter (PICC) is present, the PICC may be utilized in emergent situations **ONLY** after:
  - Personnel are wearing gloves, eyewear, and a mask
  - Access port is thoroughly cleaned with alcohol
  - 10mL of fluid are withdrawn from the PICC and discarded prior to any administration
  - Patency is confirmed by flushing the PICC with 10mL of NORMAL SALINE
  - **DO NOT** use any syringe smaller than a 10mL syringe for any administration
  - If the PICC line does not flush easily, **ABORT** procedure and establish IV/IO

ADULT & PEDIATRIC

INTRAOSSEOUS SITES (EZ-IO)

- An IO should be placed for a patient with an emergency medical condition that requires urgent vascular access in whom an IV is not immediately obtainable or is deemed to have insufficient access
- Adult: (In order of preference)
  - Proximal Humerus
  - Proximal Tibia
  - Distal Femur
  - Distal Tibia
- Pediatric: (In order of preference)
  - Distal Femur
  - Proximal Tibia
  - Distal Tibia
  - Proximal Humerus (**ONLY** if the surgical neck can be palpated)

INTRAMUSCULAR (IM) INJECTIONS

- All IM injections shall be administered in the lateral thigh.
- Adults:
  - 21 gauge 1.5 inch needle
  - 4mL maximum per site
    - If > 4mL needs to be administered, split the dose between both thighs
- Pediatric:
  - 23 gauge 1 inch needle
  - 1mL maximum per site
    - If > 1mL needs to be administered, split the dose between both thighs

MUCOSAL ATOMIZATION DEVICE (MAD)

- The following medications can be administered via the MAD:
  - VERSED
  - FENTANYL
  - NARCAN
  - KETAMINE
- Desired dose:
  - 0.3mL - 0.5mL per nostril
  - Max 1mL per nostril

MAD TIPS

- **Suction nares prior to IN administration of medications when secretions are present.**
- **Rapidly depress syringe plunger to atomize medications.**
- **When possible, split medication between both nares.**

MEDICATION DILUTION INSTRUCTIONS

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Discard 9mL of EPI 1:10,000 (0.1mg/mL) and draw up 9mL of NORMAL SALINE to create PUSH-DOSE PRESSOR EPI 1:100,000. This will yield 10mcg/mL.

  OR

  - **Dilute**: Draw up 0.5mL of EPI 1:1,000 (1mg/mL) with a 1mL syringe and add it to a 50mL bag of NORMAL SALINE to create PUSH-DOSE PRESSOR EPI 1:100,000. This will yield 10mcg/mL.
- BENADRYL:
  - **Dilute** with 9mL of NORMAL SALINE for IV/IO administration

MEDICATION INFUSION INSTRUCTIONS

- Add medication to a 50mL bag of NORMAL SALINE first, then spike with solution set.
- Ensure all 50mL are administered, including remaining fluid in solution set.
- Medication infusions administered as a "rapid infusion":
  - Add the medication to a 50mL bag of NORMAL SALINE
  - Administer IV/IO by utilizing a 60 gtt set, run wide open
- Medication infusions administered over 10 minutes:
  - Add the medication to a 50mL bag of NORMAL SALINE
  - Administer IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)
- Medication infusions administered over 25 minutes:
  - Add the medication to a 50mL bag of NORMAL SALINE
  - Administer IV/IO by utilizing a 15 gtt set delivering 30gtts/min (1gtts/2sec)

WARNING
ALL medications diluted into NORMAL SALINE must be labeled.

THE "HANDTEVY" SYSTEM

- Should be utilized in the resuscitation and treatment of all patients (Adult & Pediatric)
- For a pediatric patient, the child's age should be used as the primary reference point for determining the appropriate patient care.
  - If the child appears shorter/taller than stated age, or if the age is unknown, use the "Handtevy" system length based tape.

PEDIATRIC

- A patient who has not reached puberty is considered a pediatric patient and shall be treated under the pediatric guideline section of these protocols.
- A patient who has reached puberty shall be treated as an adult.
- IO is the preferred method of vascular access during pediatric cardiac arrest.

PEDIATRIC AGE CLASSIFICATIONS

- Neonates:
  - Birth to 1 month
- Infants:
  - 1 month to 1 year
- Children:
  - 1 year to puberty

PUBERTY

- **Female puberty is defined as breast development.**
- **Male puberty is defined as underarm, chest, or facial hair.**
- **Once a child reaches puberty, use the adult guidelines for treatment.**

ADULT & PEDIATRIC

MENTAL STATUS (AVPU)

- **A**lert: to person, place, time, and event (AAOX4)
- **V**erbal: responds only to verbal stimuli
- **P**ain: responds only to painful stimuli
- **U**nresponsive

Patient with Altered Mental Status consider:
AEIOU-TIPS

- **A**lcohol/**A**cidosis
- **E**pilepsy (Seizures)/**E**lectrolytes
- **I**nsulin (Hyper-/Hypoglycemia)
- **O**verdose/**O**xygenation/**O**piates
- **U**remia (Kidney Failure)

- **T**rauma/**T**emperature/**T**umor
- **I**nfection (Sepsis)
- **P**sychiatric/**P**oisoning
- **S**troke/**S**hock/**S**yncope

VITAL SIGNS

- All patients shall receive at least 2 sets of vital signs. Vital signs shall include the following:
  - Pulse (rate, rhythm, and quality)
  - Respirations (rate and quality)
  - Temperature
  - Pulse Oximetry
  - $EtCO_2$ (as indicated below)
  - BGL (as indicated below)
  - Blood Pressure (capillary refill)
    - The first two blood pressures shall be manually obtained on **ALL** patients.
    - The automatic blood pressure cuff may be utilized after two manual blood pressure readings are obtained.
    - A manual blood pressure shall be taken to confirm any abnormal or significant changes of an automatic blood pressure cuff reading.
- Hypotension for adults is defined as SBP < 90 mmHg, unless otherwise noted in a specific protocol.
- Refer to the "Handtevy" system for all pediatric vital sign parameters.
- All patients shall be reassessed before and after administration of a medication.
- Both priority 1 and 2 patients shall have their vital signs reassessed at a minimum of every 5 minutes.

$EtCO_2$ MONITORING

- Before an $EtCO_2$ waveform can be accurately assessed, the $EtCO_2$ waveform shall be printed.
- **DO NOT** use the compressed image on the cardiac monitor to interpret $EtCO_2$ waveform.
- $EtCO_2$ shall be monitored for the following patients:
  - Requiring ventilatory support (e.g., BVM, ET tube, SGA, CPAP)
  - Respiratory distress
  - Altered Mental Status
  - Patient who has been sedated
  - Patient who has received pain medication
  - Seizure

GLUCOSE

- A BGL shall be documented for a patient with any of the following:
  - History of diabetes
  - Altered Mental Status
  - General weakness
  - Seizure
  - Syncope/lightheadedness
  - Dizziness
  - Poisoning
  - Stroke
  - Cardiac arrest

ADULT & PEDIATRIC

ECG MONITORING

- All ALS patients shall be continuously monitored in Lead II.
- Consideration should be given to obtaining a 15 lead ECG followed by a 12 lead ECG within 5 minutes of patient contact.
- ECGs should be repeated every 10 minutes
    - Leave cables connected in a 12 lead configuration until the patient is turned over to the Emergency Department.
    - If posterior wall STEMI is suspected, 15 lead ECGs should also be repeated every 10 minutes.
- 15 lead and 12 lead ECGs shall be performed on the following patients:
    - Altered Mental Status
    - Chest/arm/neck/jaw/upper back/shoulder/epigastric pain or discomfort
    - Palpitations
    - Syncope, lightheadedness, general weakness, or fatigue
    - Overdose emergencies
    - CHF, SOB, hypertension, or hypotension
    - Unexplained diaphoresis or nausea
    - ROSC
    - Bradycardia **OR** tachycardia
        - Adult:
            - Heart rate < 50 beats per minute **OR** > 100 beats per minute
        - Pediatric:
            - Age appropriate bradycardia **OR** tachycardia as defined in the "Handtevy" system

PATIENT HISTORY

- CHIEF COMPLAINT: Why did the person call 911?
- S.A.M.P.L.E. HISTORY **(S.A.M.P.L.E)**
    - **SIGNS & SYMPTOMS**
    - **ALLERGIES**
    - **MEDICATIONS:** Prescribed, over the counter, or not prescribed to patient
    - **PAST MEDICAL HISTORY (patient's and immediate family's)**
    - **LAST ORAL INTAKE**
    - **EVENTS PRECEDING**
- HISTORY OF THE PRESENT ILLNESS **(O.P.Q.R.S.T.A)**
    - **ONSET**: Did the symptoms appear gradually or suddenly?
    - **PALLIATIVE**: What makes the symptoms better?
    - **PROVOKE:** What makes the symptoms worse?
    - **PREVIOUS:** Previous similar episodes?
    - **QUALITY:** What kind of pain? (pressure, squeezing, aching, dull, etc.)
    - **RADIATION:** Does the pain or discomfort radiate? Where?
    - **SEVERITY OF PAIN:** 1-10 scale (use "Faces" pain scale for pediatrics)
    - **TIME:** What time did the symptoms begin?
    - **ASSOCIATED**: What are the associated signs & symptoms?

ADULT & PEDIATRIC

AIRWAY

- AIRWAY POSITIONING:
  - Align ear to sternal notch and face parallel with ceiling
  - Modified jaw thrust for suspected spinal injury
  - Elevate the head of stretcher 15-30 degrees when possible
    - Ramp positioning should be used for infants and obese patients

Infant

Pediatric

Adult

- NASOPHARYNGEAL AIRWAY (NPA):
  - Semi-conscious patient with an intact gag reflex should have a nasopharyngeal airway inserted, unless contraindicated.
- OROPHARYNGEAL AIRWAY (OPA):
  - Unresponsive patient without a gag reflex shall have an oropharyngeal airway inserted, unless contraindicated.

OXYGEN ADMINISTRATION

- **DO NOT** withhold OXYGEN if the patient is dyspneic or hypoxic.
- SpO_2:
  - Maintain SpO_2 of 95% for:
    - All patients
      - **Exception:** COPD & Asthma
  - Maintain SpO_2 of 90% for:
    - COPD & Asthma
- OXYGEN ADMINISTRATION:
  - 2 LPM via NC **REGARDLESS** of SpO_2
    - All Stroke patients (increase oxygen therapy as needed)
  - 15 LPM via NRB **REGARDLESS** of SpO_2
    - All 3rd trimester pregnancy trauma patients
    - All head injury patients
    - All actively seizing and postictal patients
    - All patients in hemorrhagic shock
    - KETAMINE or DROPERIDOL administration for sedation
    - Carbon Monoxide exposure
    - Cyanide exposure
    - Decompression sickness
- If oxygen saturation cannot be maintained, ventilatory support should be provided.

CIRCULATION

- Assess for:
  - Pulses (rate, rhythm, and quality)
  - Capillary refill
  - Skin color, condition, and temperature

Ventilatory Assistance

INFORMATION

- In certain patients, excessive ventilation rates may be harmful.
- Overzealous positive pressure ventilation can impair:
  - Venous return
  - Cardiac output
  - Cerebral perfusion
- Ultimately, the patient's SpO_2 and $EtCO_2$ should determine the ventilation rate for the patient (ideally $EtCO_2$ should be 35-45 mmHg).
- Each ventilation should be delivered with a manometer pressure of 15-20cmH_2O.

ADULT

VENTILATORY RATES

- PATIENT WITH A PULSE:
  - 1 ventilation approximately every 6 seconds
    - Titrate ventilations to maintain SpO_2 ≥ 95% (≥ 90% for COPD & Asthma)
    - Titrate ventilations to maintain $EtCO_2$ 35-45 mmHg
  - Provide each ventilation over 1 second
- PATIENT WITHOUT A PULSE:
  - 1 ventilation every 10 seconds and an additional ventilation during every rhythm check. Coordinate compressions and ventilations to avoid simultaneous delivery.
  - Provide each ventilation over 1 second

PEDIATRIC

VENTILATORY RATES

- PATIENT WITH A PULSE:
  - 1 ventilation approximately every 3 seconds
    - Titrate ventilations to maintain SpO_2 ≥ 95% (≥ 90% for COPD & Asthma)
    - Titrate ventilations to maintain $EtCO_2$ 35-45 mmHg
  - Provide each ventilation over 1 second
    - Ventilations should be delivered over 1 second to prevent "Auto PEEP" in the pediatric patient with a pulse.
- PATIENT WITHOUT A PULSE:
  - 1 ventilation every 10 seconds and an additional ventilation during every rhythm check. Coordinate compressions and ventilations to avoid simultaneous delivery.
    - 1 ventilation every 3 seconds during a neonatal resuscitation
  - Provide each ventilation over 1 second

The preferred method for ventilating a pediatric patient is with a BVM in conjunction with an oral and/or nasal airway. Pediatric patients who cannot protect their airway, are unable to maintain oxygen saturation despite BVM ventilation, and/or cannot be effectively ventilated with a BVM, should be upgraded to an age specific Supraglottic Airway (SGA) followed by intubation if needed.

WARNING
DO NOT ATTEMPT TO AGGRESIVELY NORMALIZE CAPNOMETRY/$EtCO_2$ READINGS IN THE FOLLOWING PATIENTS:

- **Cardiac arrest pre/post ROSC**
- **Bronchospasm (e.g., asthma, COPD)**
- **High $EtCO_2$ levels are acceptable and even desired in these patients**

Positive End-Expiratory Pressure (PEEP)

INFORMATION

- The addition of a Positive End-Expiratory Pressure (PEEP) Valve to a Bag-Valve mask (BVM) is a non-invasive means of increasing oxygenation when assisted ventilations alone are not able to maintain oxygen saturation.
- PEEP is indicated when SpO_2 cannot be maintained ≥ 93% after:
  - Airway positioning
  - Use of airway adjuncts
  - Ventilations with BVM
- Examples of a patient that should require PEEP:
  - Drowning
  - Delayed Sequence Induction (DSI)
  - Hypoxia secondary to pulmonary disease (e.g., COPD, Asthma, CHF)

ADULT & PEDIATRIC

PEEP IN CONJUNCTION WITH BVM/CPAP/SGA/ETT

- PEEP:
  - 5 - 10cmH_2O
    - Refer to specific protocol for initial PEEP setting
  - Contraindications:
    - Cardiac Arrest
    - Trauma
    - Hypotension
  - Precautions:
    - Increased airway pressure will increase intrathoracic pressure, thus decreasing venous return and decreasing cardiac output.
    - Increased potential for barotraumas (e.g., pneumothorax)
  - Titrate the PEEP setting to optimize SpO_2 and $EtCO_2$ readings
  - Certain clinical presentations may benefit from 10cmH_2O (e.g., drowning, CHF, etc.)

WARNING

- **Auto PEEP occurs during assisted ventilations when air goes in before a full exhalation is allowed, putting the patient at risk for a pneumothorax.**
- **Increasing intrathoracic pressure can decrease venous return to the heart which may result in hypotension.**
- **Patients with COPD & Asthma have prolonged exhalation secondary to bronchospasm, which causes air trapping resulting in hypercapnia (high levels of CO_2). Therefore, $EtCO_2$ guidelines should be disregarded for these patients, as it is more important to maintain SpO_2 levels ≥ 90%.**

Adult Transport Destinations

INFORMATION

- **The Lieutenant shall remain in the patient care compartment during transport for all patients.**
- **Transport times are estimated and factors such as traffic, weather, and road conditions should be considered.**

Priority 1:
- Patient in **Cardiac/Respiratory/Trauma Arrest** or **ROSC**

Priority 2:
- Patient **WITH** immediate, life-threatening conditions

Priority 3:
- Patient **WITHOUT** immediate, life-threatening conditions

WARNING
- **Placing a patient in the prone position is contraindicated due to the risks of asphyxiation.**
- **However, impalement or other situations may mandate the prone position.**
- **In these instances, SpO_2, $EtCO_2$, and justification shall be documented in the ePCR narrative and attention to airway maintenance is mandatory.**

ADULT

PRIORITY 1 PATIENT
- CARDIAC ARREST:
  - If transport time is < 20 minutes:
    - Transport to the closest STEMI facility
  - If transport time is > 20 minutes:
    - Transport to the closest Emergency Department (ED), excluding any freestanding ED
- RESPIRATORY ARREST:
  - Transport to the closest ED, excluding any freestanding ED
- TRAUMA ARREST:
  - If Trauma Hawk is not available and ground transport is greater than 40 minutes, it is acceptable to transport to the nearest ED.

PRIORITY 2 PATIENT
- Shall be transported to the closest appropriate ED
- STROKE ALERT:
  - All Stroke Alerts shall be transported to a Comprehensive Stroke Center
    - **Exception:** Known terminal illness or Hospice Care patients can still be treated as a **STROKE ALERT**. Transport these patients to the closest Stroke Center (Primary **OR** Comprehensive).
  - If ground transport is > 40 minutes, transport by air to the closest Comprehensive Stroke Center.
- STEMI ALERT:
  - Shall be transported to the closest STEMI facility
  - If ground transport is > 40 minutes, transport by air to the closest STEMI facility with surgical backup.
  - Patient presentations that are indicative of myocardial ischemia that **DO NOT** meet "STEMI Alert Criteria" shall be transported to a STEMI facility.
- TRAUMA ALERT:
  - Shall be transported to the closest Trauma Center. If on bypass, transport patient to the next closest Trauma Center
  - A minimum of 1 paramedic and 1 EMT must accompany a trauma alert patient in the back of the rescue, provided it does not cause a significant delay in transport.
  - On-scene times for a Trauma Alert patient should be < 10 minutes. On-scene times > 10 minutes shall have the reason for the delay documented in the ePCR narrative.
  - If ground transport is > 25 minutes, transport by air.
  - Trauma patients who arrest in the presence of Fire Rescue personnel, shall be transported to the closest Trauma Center.

PRIORITY 2 PATIENT CONTINUED

- PREGNANT TRAUMA ALERT (visibly or by history of gestation > 20 weeks):
  - A pregnant patient meeting Trauma Alert criteria should be transported to St. Mary's Trauma Center whenever possible.
- SEPSIS ALERT:
  - All Sepsis Alerts shall be transported to closest ED (excluding any freestanding ED).
- ST. MARY'S HYPERBARIC CHAMBER (encode prior to transport to confirm availability):
  - Decompression Sickness
  - Carbon Monoxide Exposure
  - Hydrogen Sulfide Exposure
  - Cyanide Exposure
  - If ground transport is > 40 minutes, transport by air
    - **Exception:** HAZMAT contaminated patients will not be transported by air
- INTUBATED INTER-FACILITY TRANSFER:
  - The patient should be sedated by the sending facility and paralyzed if indicated.
  - The EMS Captain must:
    - Accompany the patient to the receiving facility
    - Refer to the "Delayed Sequence Induction" protocol (pp. 59-61)
- OBSTETRICAL:
  - Unstable OB patients (gestation > 20 weeks) should be transported to the closest OB ED, whenever possible.
  - If ground transport to the closest OB ED is greater than 20 minutes, it is acceptable to transport to the nearest ED.

PRIORITY 3 PATIENT

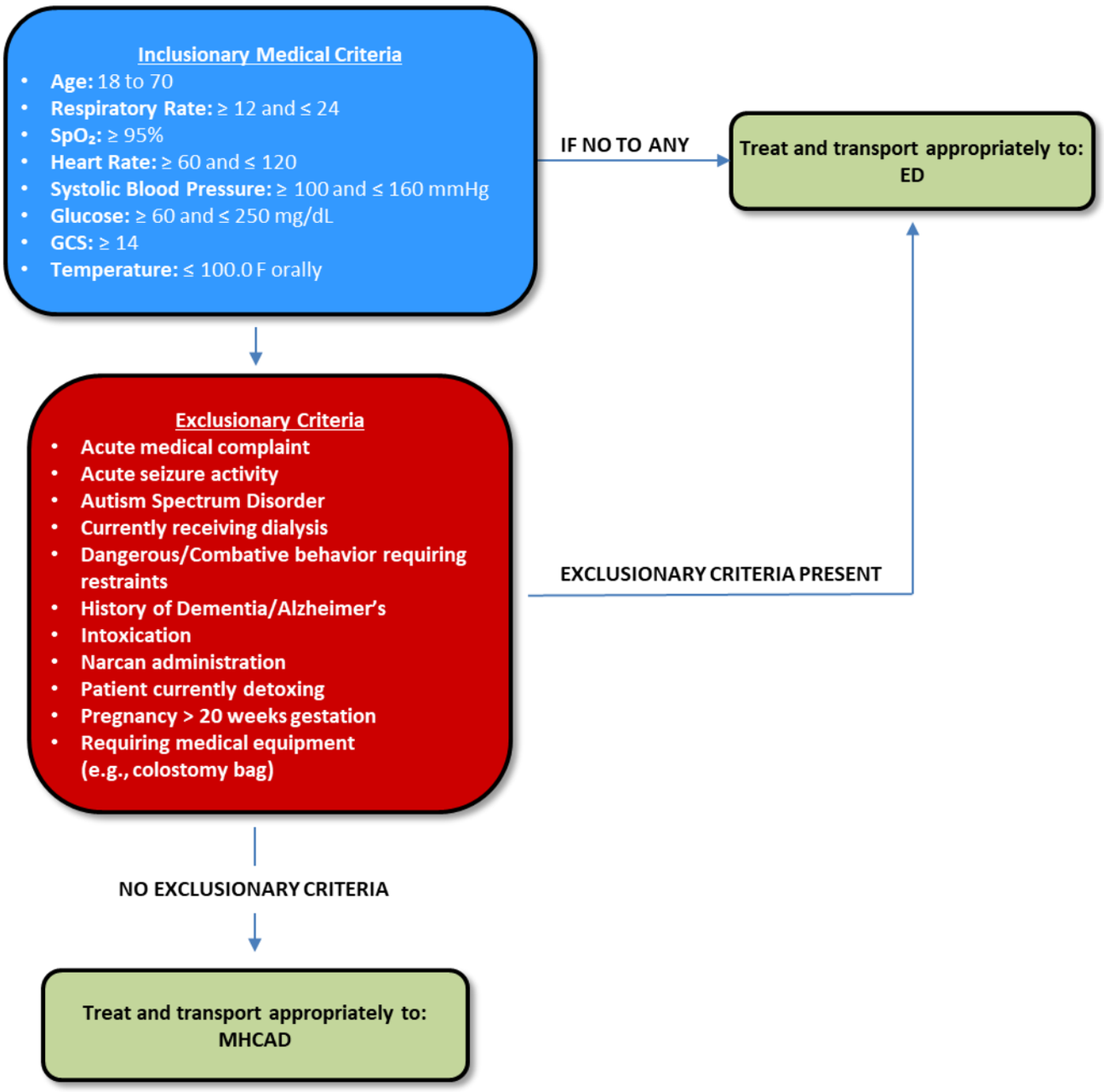
- Should be transported to the closest appropriate ED of their choice within 40 minutes. EMS Captains may approve/decline transport requests longer than 40 minutes.
- FREESTANDING ED:
  - Stable patients may be transported to a "freestanding ED" after:
    - Being informed if they need to be admitted, they will be transferred to another facility
    - Signing an Emergency Transport Disclaimer
    - **DO NOT** transport the following patients to a freestanding ED:
      - Baker Act
      - Acute Psychiatric Disorder
      - Intoxication
- OBSTETRICAL:
  - Obstetrical (OB) patients are defined as gestation > 20 weeks.
  - Stable OB patients should be transported to the OB ED of their choice within 40 minutes.
- BAKER ACT:
  - Stable Baker Act patients shall be transported to the closest appropriate Baker Act facility.
  - Unstable Baker Act patients shall be transported to the closest ED for stabilization.
  - Mental Health Center Alternative Destinations (MHCAD) may be utilized if the patient meets all criteria outlined in the MHCAD protocol.
- ADDICTION STABILIZATION UNIT (ASU):
  - Stable patients who are exhibiting symptoms related to recreational drug or alcohol use should be transported to the ASU, with patient consent.
  - If transport time to ASU is > 25 minutes, transport to ED of their choice within 40 minutes.
  - EMS Captains may approve/decline transport requests to ASU longer than 25 minutes.

Mental Health Center Alternative Destination

INFORMATION

- Consideration should be given to transporting a patient with a diagnosed **chronic** mental disorder to a Mental Health Center Alternative Destination, if applicable.
- Whenever possible, bring all prescribed medications to the receiving facility.
- The patient must meet the following criteria to be transported to a Mental Health Center Alternate Destination (MHCAD):
  - Diagnosed psychiatric history
  - Ambulatory
  - Does not require the use of an assisted walking device
- Utilize the unit assigned cell phone to contact the MHCAD to confirm the acceptance of the patient

ADULT



Pediatric Transport Destinations

INFORMATION

- For the purposes of transport, a pediatric patient is considered < 18 years old
- **The Lieutenant shall remain in the patient care compartment during transport for all patients.**
- Transport times are estimated and factors such as traffic, weather, and road conditions should be considered

BASIC PEDIATRIC EMERGENCY DEPARTMENT (BPED)

- These hospitals **DO NOT** have pediatric admitting capabilities but are comfortable treating **MINOR** pediatric illnesses and injuries in their ED.

ADVANCED PEDIATRIC EMERGENCY DEPARTMENT (APED)

- These hospitals **DO NOT** have pediatric admitting capabilities but are capable of providing **ADVANCED** level pediatric care and resuscitation in their ED.

COMPREHENSIVE PEDIATRIC EMERGENCY DEPARTMENT (CPED)

- These hospitals have complete pediatric admitting capabilities and surgery options.
- The following conditions should be transported to a CPED whenever possible:
    - Cardiac dysrhythmia/arrest
    - Severe respiratory distress/arrest
    - Pediatric patient who has achieved ROSC
    - Sepsis Alerts
    - Cyanosis
    - Persistent Altered Mental Status not due to trauma
    - Status epilepticus
    - Brief Resolved Unexplained Event (BRUE) ≤ 12 months of age

PEDIATRIC

PRIORITY 1 PATIENT

- TRANSPORT TO COMPREHENSIVE PEDIATRIC EMERGENCY DEPARTMENT (CPED):
    - Pediatric patient who has achieved ROSC
    - Pediatric respiratory arrest patient that has successful airway management (e.g., good compliance with the BVM and airway adjuncts, positive $EtCO_2$ waveform, improving pulse oximetry)
    - If ground transport to a CPED is > 20 minutes, transport to the closest APED
- TRANSPORT TO CLOSEST APED OR CPED:
    - Pulseless pediatric patient
    - Pediatric respiratory arrest patient who has an unstable airway (e.g., unable to ventilate or oxygenate)
- TRAUMA ARREST:
    - If Trauma Hawk is not available and ground transport is > 40 minutes, it is acceptable to transport to the nearest ED

PRIORITY 2 PATIENT

- TRAUMA ALERT PATIENT:
    - Shall be transported to the closest Trauma Center. If on bypass, transport patient to the next closest Trauma Center
    - A minimum of 1 paramedic and 1 EMT must accompany a trauma alert patient in the back of the rescue, provided it does not cause a significant delay in transport.
    - On-scene times for Trauma Alert patients should be < 10 minutes. On-scene times > 10 minutes shall have the reason for the delay documented in the ePCR narrative.
    - If ground transport is > 25 minutes, transport by air.
    - Trauma patients who arrest in the presence of Fire Rescue personnel, shall be transported to the closest Trauma Center.

PRIORITY 2 PATIENT CONTINUED

- STEMI ALERT:
  - Shall be transported to Joe DiMaggio Children's Hospital.
  - If ground transport is > 40 minutes, transport by air.
    - The Medical Director shall approve/decline transport by air to Joe DiMaggio Children's Hospital.
  - If the patient cannot be transported to Joe DiMaggio Children's Hospital, transport to the closest CPED.
- STROKE ALERT:
  - All Pediatric Stroke Alerts shall be transported to St. Mary's Medical Center.
  - If ground transport is > 40 minutes, transport by air to St. Mary's Medical Center.
- SEPSIS ALERT:
  - Shall be transported to closest CPED
  - If ground transport to a CPED is > 40 minutes, transport to the closest APED.
- ST. MARY'S HYPERBARIC CHAMBER (encode prior to transport to confirm availability):
  - Decompression Sickness
  - Carbon Monoxide Exposure
  - Hydrogen Sulfide Exposure
  - Cyanide Exposure
  - If ground transport is > 40 minutes, transport by air
    - **Exception:** HAZMAT contaminated patients will not be transported by air

PRIORITY 3 PATIENT

- Should be transported to the closest appropriate pediatric ED
- BAKER ACT:
  - Stable Baker Act patients shall be transported to JFK Medical Center North Campus.
  - Unstable Baker Act patients shall be transported to the closest appropriate APED or CPED for stabilization.

Helicopter Transport Criteria

ADULT & PEDIATRIC

- The Pilot In Charge (PIC) has final authority to approve/decline the transport.
- The flight crew must be capable of loading, unloading, and treating the patient within the confines of the aircraft.

HELICOPTER CRITERIA FOR TRAUMA PATIENTS:

- Pre-hospital ground transport to a Trauma Center is > 25 minutes
- Pre-hospital scene extrication time > 15 minutes
- Pre-hospital ground response time to the scene is > 10 minutes
- Mass Casualty Incidents (MCI) involving multiple patients with traumatic injuries

HELICOPTER MAY BE USED UNDER THE FOLLOWING CONDITIONS:

- For any patient weighing 350lbs-500lbs, discretion should be used as to whether air transport is the preferred method of transport.
- EMS Captain discretion

HELICOPTER SHALL NOT BE USED UNDER THE FOLLOWING CONDITIONS:

- Bariatric patient known or estimated to be five-hundred pounds (500lbs) (227kg) or greater
- Patient who is unable to lay supine (when clinically indicated for air transport)
- Patient who is combative and cannot be physically and/or chemically restrained
- Hazmat contaminated patient

BASIC LIFE SUPPORT

BLS Medical Emergencies (p. 27)

Treat in Place (p. 28)

BLS Trauma Emergencies (pp. 29-31)

BLS Bites and Stings (p. 32)

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ADULT & PEDIATRIC

ALLERGIC REACTION

- Allergic reactions are characterized by any of the following:
  - Generalized urticaria
  - Airway, tongue, or facial swelling
  - Respiratory distress, bronchospasm
  - Nausea, vomiting, or diarrhea
  - Loss of radial pulse **OR** SBP of < 90 mmHg
- Determine the source of the allergic reaction (insect, food, medications, etc.).
- If patient presents with airway swelling/respiratory distress/bronchospasm/tongue and/or facial swelling/loss of a radial pulse **OR** SBP of < 90 mmHg:
  - Assist patient with prescribed Epi-Pen

CARDIAC ARREST

- Refer to the "Cardiac Arrest" algorithm (p. 89 & p. 92) for all patients found pulseless.

OVERDOSE/POISONING

- Personnel should use caution and appropriate PPE to avoid accidental exposure.
- Try to identify source of the overdose/poisoning.
- Consider contacting the **Florida Poison Control Center** at **1-800-222-1222.**
- Administer NARCAN if available/applicable.

SEIZURES

- Consider the possible causes:
  - Meningitis
  - Fever
  - Head trauma
  - Hemorrhagic stroke
  - Drugs
  - Alcohol
  - Diabetic
  - Poisoning
- Protect patient from injury if actively seizing.
- OXYGEN:
  - 15 LPM via NRB regardless of SpO_2
  - Leave OXYGEN in place throughout postictal period

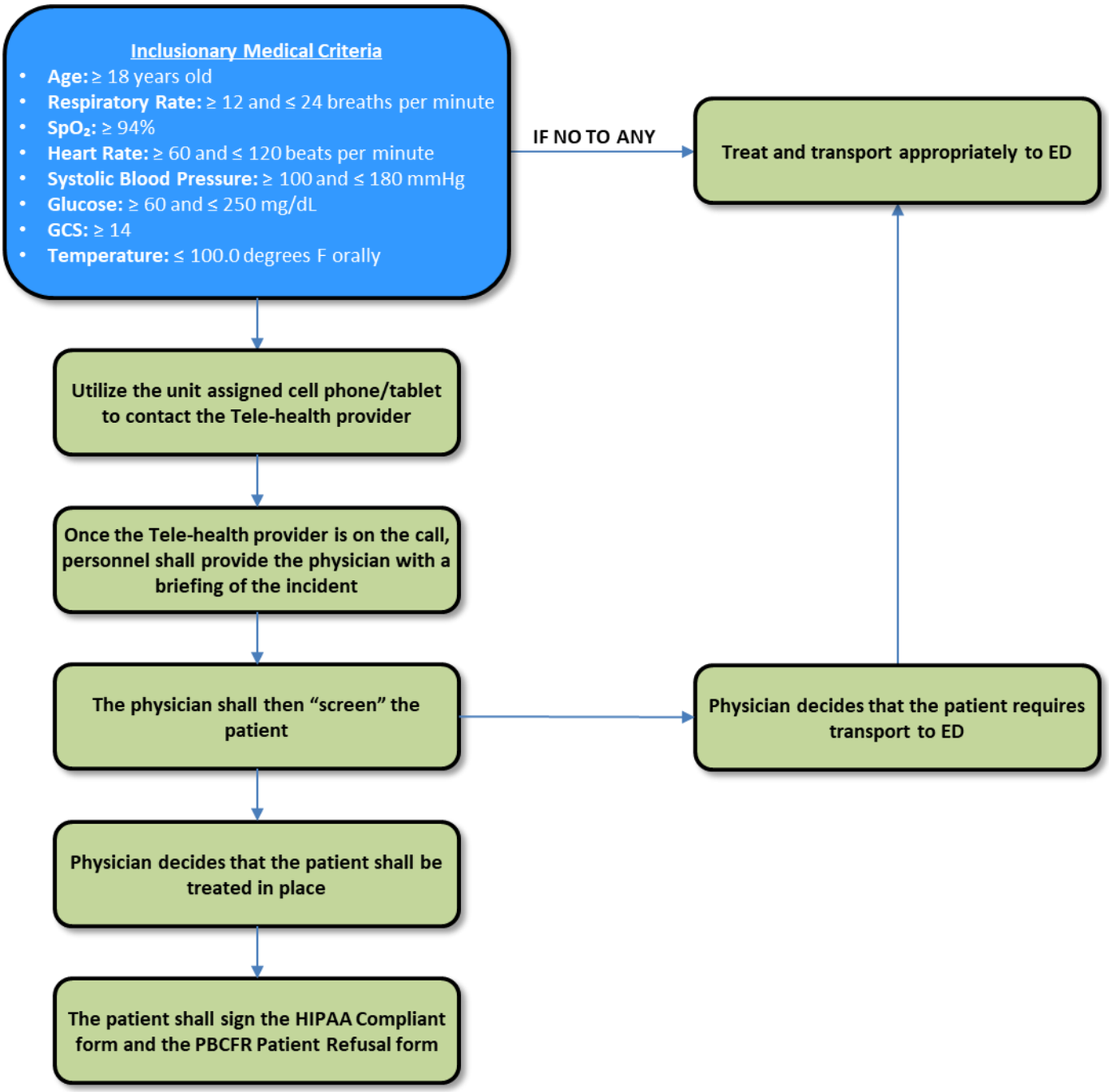
ALTERED MENTAL STATUS

- Check and record BGL.
- If BGL is < 60 mg/dL, and patient is able to protect their airway/swallow:
  - ORAL GLUCOSE:
    - 15g, if able to swallow and follow commands
    - May repeat 1x prn
    - Contraindications:
      - Not conscious enough to swallow
      - < 2 years old

INFORMATION

- The ET3 model allows delivery of in-home consultations for low-acuity calls.
- Effective implementation aims to improve avoidable transports and unnecessary hospitalizations.
- Examples of a patient that may receive Treat-in-Place include but are not limited to:
  - Chronic Back Pain
  - Fall with injury
  - Fall uninjured
  - Minor Hemorrhage
  - Headache
  - Medical Alarm (unknown problem)
  - Sick Person
  - Minor Traumatic Injury
  - Unknown Medical

ADULT



ADULT & PEDIATRIC

EXPOSE

- As a general rule, only remove as much of the clothing as necessary to determine the presence or absence of an injury. Cover the patient as soon as possible to keep the patient warm.

SPINAL MOTION RESTRICTION (CERVICAL COLLAR ONLY)

- Perform manual Spinal Motion Restriction by providing manual cervical stabilization and apply an appropriately sized cervical collar if the patient meets any of the following criteria:
  - Complaint or finding of focal neurologic deficit on motor or sensory exam
  - Complaint or finding of pain to the neck or back
  - Presence of a distracting injury
  - Altered level of consciousness with an Mechanism of Injury (MOI)
  - Intoxication with an MOI present
- The key objective is to move the patient in the safest, most anatomically neutral position possible.
- If an appropriately sized collar is not available or if the collar compels the patient to move, remove the collar and provide alternate Spinal Motion Restriction:
  - Place rolled towels on the sides of the patient's head and neck
  - Secure with tape or other similar devices to allow for comfortable cervical stabilization/ immobilization
  - The cervical collar should not cause the patient discomfort such that they are compelled to move
- Place the patient supine on the stretcher cushion.
- If the patient is unable to tolerate this position, place in a position of comfort that also respects normal anatomical alignment.

HELMET REMOVAL

- Helmets should be removed from all patients.
- If applicable, protective pads should also be removed.
- Athletic trainers should be consulted in the helmet/protective pad removal process if applicable.
- Spinal Motion Restriction should be manually performed during the removal process.

BURNS

- Refer to the "Burn Injuries" protocol (pp. 134-135)

EYE EMERGENCIES

- CHEMICAL EXPOSURES:
  - Remove contact lens if present
  - Irrigate the affected eye(s) with NORMAL SALINE
  - Be careful not to contaminate the unaffected eye with runoff
- PENETRATING EYE INJURIES:
  - Stabilize any penetrating object
  - Cover both eyes with gauze and an eye shield
  - Keep the patient calm; crying, screaming, or coughing can force more of the tissue outward
  - **DO NOT** attempt to replace or move the protruding tissue

CLOSED FRACTURES

- Fractures should be splinted in the position found.
  - **Exception**: No pulse present **OR** the patient cannot be transported due to the extremity's unusual position.
    - Place SpO_2 probe distal to injury to assess circulation utilizing pleth waveform.
    - 2 attempts can be made to place the injured extremity in a normal anatomical position.
    - Discontinue attempts if:
      - The patient complains of severe pain

OR

      - If there is resistance to movement felt
    - Reassess neurovascular status before and after repositioning of patient's extremity.
- CLOSED MID-SHAFT FEMUR FRACTURES
  - Apply a Sager Traction Splint
    - Contraindications:
      - Suspected pelvic fracture
      - Open femur fracture
      - Suspected hip fracture
      - Avulsion/amputation of the ankle or foot
      - Suspected fracture distal to mid-shaft femur
    - Reassess neurovascular status before and after repositioning of patient's extremity.

OPEN FRACTURES

- Refer to the "Open Fracture" protocol (p. 139)

HIP FRACTURES & HIP DISLOCATIONS

- Consider hip fractures in an elderly patient who fell and complains of pain in the knee, hip, or pelvis.
- A combi-board should be used whenever possible to move a patient with a suspected hip fracture.
- Splint in position of comfort with pillows and blankets.
- Reassess neurovascular status before and after moving the patient.
- Sager Traction Splints **SHALL NOT** be used on suspected hip fractures or hip dislocations.
- POSTERIOR HIP DISLOCATIONS:
  - Most often present with the leg flexed and internally rotated, and will not tolerate having the extremity straightened
- ANTERIOR HIP DISLOCATIONS:
  - Present with external rotation and shortening of the affected leg

UNSTABLE PELVIC FRACTURE

- Refer to the "Unstable Pelvic Fracture" protocol (p. 140)

BLEEDING CONTROL

- EXTREMITY INJURIES:
  - Direct pressure (utilizing manual pressure and pressure dressings)
  - Combat Application Tourniquet (C.A.T.)
    - Apply high and tight on a single long bone
      - **DO NOT** apply C.A.T. directly over injury site or joint.
    - Tighten the C.A.T. until the bleeding stops
    - If bleeding persists, apply a second C.A.T. directly below the initial C.A.T.
  - Celox Rapid (If 2nd C.A.T. application fails to control bleeding):
    - Pack wound with Celox Rapid
    - Maintain pressure for a minimum of 1 minute
    - Apply a pressure dressing
- JUNCTIONAL HEMORRHAGE (e.g., neck, axillary, pelvis, and groin):
  - Celox Rapid
    - Pack wound with Celox Rapid
    - Maintain pressure for a minimum of 1 minute
    - Apply a pressure dressing

ALL EXTREMITY TRAUMA

- Gross contamination, such as leaves or gravel, should be removed if possible.
- Determine MOI and evaluate.
- Assess neurovascular status of extremity
  - Color, temperature, capillary refill, and/or crepitus

AMPUTATION

- Rinse off
- Wrap in sterile gauze and place in a sealed plastic bag.
- Place the sealed bag into a second bag with ice packs.
- Label the bag with the patient's:
  - Name
  - Date
  - Time of the amputation
  - Time the part was wrapped and cooled

ABDOMINAL TRAUMA

- IMPALED OBJECTS:
  - Impaled objects shall be stabilized to prevent movement and subsequent further damage.
  - If bleeding occurs around the impaled object, it should be controlled by holding direct pressure
    - **DO NOT** apply excessive pressure
  - **DO NOT** palpate the abdomen, as it may cause further organ injury from the distal tip of the object.
- EVISCERATION:
  - Protect the tissue from further damage.
  - Cover the protruding tissue with a moist, sterile dressing; then cover with a dry, sterile dressing.
  - Keep the patient calm; crying, screaming, or coughing can force more of the tissue outward.
  - **DO NOT** attempt to replace or move the protruding tissue.

BLS Bites and Stings

INFORMATION

- Consider contacting the **Florida Poison Control Center** at **1-800-222-1222 OR DAN (Divers Alert Network)** at **(919) 684-4326** as soon as possible for treatment recommendations.

ADULT & PEDIATRIC

ALL BITES AND STINGS

- Clean the wound area with soap and water or sterile water
  - **Exception**: Marine animal stings
  - **DO NOT** use hydrogen peroxide on deep puncture wounds or wounds exposing fat
- Refer to the "Allergic Reaction" protocol (pp. 35-36), if applicable.
- Advise dispatch to contact animal control or the police department if necessary.

SNAKE BITES

- **DO NOT** apply ice packs, tourniquets, or constrictive bands.
- Mark area of edema with a pen.
- Remove any constrictive jewelry or clothing.
- Splint any extremity that has received a bite and ensure it remains below the heart.
- If the dead snake is on scene, take a picture of the head (including the eyes) with the ePCR device if possible.
- For hypotension refer to the "Fluid Resuscitation" protocol (p. 40).

INSECT STINGS

- Remove the stinger by scraping the patient's skin with the edge of a flat surface (e.g., a credit card).
  - **DO NOT** attempt to pull the stinger out as this action may release more venom.

MARINE ANIMAL ENVENOMATIONS: STINGRAY, SCORPIONFISH, LIONFISH, ZEBRAFISH, STONEFISH, CATFISH, WEEVERFISH, STARFISH, SEA URCHIN

- Immerse the punctures in non-scalding hot water (if available) to achieve pain relief.
- Gently wash the wound with soap and water, then irrigate it vigorously with sterile water, avoid scrubbing.

MARINE ANIMAL STINGS: JELLYFISH, MAN-OF-WAR, SEA NETTLE, IRUKANDJI, ANEMONE, HYDROID, FIRE CORAL

- Rinse the skin with sea water (if available).
  - **DO NOT** use fresh or sterile water
  - **DO NOT** apply ice
  - **DO NOT** rub the skin
- Apply white vinegar (if available) topically to the involved area until the pain is relieved (lifeguards may carry this).
- Remove large tentacle fragments using forceps with proper PPE on and stay upwind when performing this procedure.

ALS Medical Emergencies

Allergic Reaction (pp. 35-36)

Diabetic Emergencies (pp. 37-38)

Dystonic Reaction (p. 39)

Fluid Resuscitation/Dehydration (p. 40)

Hyperkalemia (pp. 41-42)

Medical Hemorrhagic Shock (p. 43)

Nausea/Vomiting (p. 44)

Seizure (pp. 45-46)

Sepsis (pp. 47-49)

Stroke (pp. 50-51)

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Allergic Reaction

INFORMATION

- Allergic reactions are characterized by any of the following:
  - Generalized urticaria
  - Airway, tongue, and/or facial swelling
  - Respiratory distress, bronchospasm
  - Nausea, vomiting, and/or diarrhea
  - Loss of radial pulse or SBP of < 90 mmHg
- Determine the source of the allergic reaction (insect, food, medications, etc.).

ADULT

MILD - GENERALIZED URTICARIA ONLY

- BENADRYL:
  - 50mg IV/IO/IM, over 2 minutes for IV/IO usage
    - **Dilute** with 9mL of NORMAL SALINE for IV/IO administration

MODERATE - AIRWAY SWELLING / ABDOMINAL PAIN / VOMITING / RESPIRATORY DISTRESS / BRONCHOSPASM / TONGUE AND/OR FACIAL SWELLING

- EPINEPHRINE (1:1,000, 1mg/mL):
  - 0.3mg (0.3mL) IM
  - May repeat 2x prn, in 5 minute intervals
  - Precaution - **DO NOT** administer within 5 minutes of Epi-Pen administration
- BENADRYL:
  - 50mg IV/IO/IM, over 2 minutes for IV/IO usage
    - **Dilute** with 9mL of NORMAL SALINE for IV/IO administration
- ALBUTEROL:
  - 2.5mg via nebulizer
  - May repeat prn
- SOLU-MEDROL:
  - 125mg IV/IO/IM/PO, over 2 minutes for IV/IO usage

SEVERE - LOSS OF A RADIAL PULSE OR SBP OF < 90 mmHg

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain SBP 100mmHg. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration
- NORMAL SALINE:
  - 1L IV/IO, assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
- BENADRYL: as noted above
- ALBUTEROL: as noted above
- SOLU-MEDROL: as noted above

PEDIATRIC

MILD – GENERALIZED URTICARIA ONLY

- BENADRYL:
  - 1mg/kg IV/IO/IM, over 2 minutes for IV/IO usage. Max single dose 50mg
    - **Dilute** with 9mL of NORMAL SALINE for IV/IO administration
  - Contraindication - Neonates

MODERATE – AIRWAY SWELLING / ABDOMINAL PAIN / VOMITING / RESPIRATORY DISTRESS / BRONCHOSPASM / TONGUE AND/OR FACIAL SWELLING

- EPINEPHRINE (1:1,000, 1mg/mL):
  - 0.01mg/kg IM. Max single dose 0.3mg
  - May repeat 2x prn, in 5 minute intervals
  - Precaution - **DO NOT** administer within 5 minutes of Epi-Pen administration
- BENADRYL:
  - 1mg/kg IV/IO/IM, over 2 minutes for IV/IO usage. Max single dose 50mg
    - **Dilute** with 9mL of NORMAL SALINE for IV/IO administration
  - Contraindication - Neonates
- ALBUTEROL:
  - 2.5mg via nebulizer
  - May repeat prn
- SOLU-MEDROL:
  - 2mg/kg IV/IO/IM/PO, over 2 minutes for IV/IO usage. Max single dose 125mg

SEVERE - LOSS OF A BRACHIAL/RADIAL PULSE OR AGE APPROPRIATE HYPOTENSION

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain age appropriate SBP. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - **DO NOT** administer faster than 1mL/minute
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration
- NORMAL SALINE:
  - 20mL/kg IV/IO, assess lung sounds and BP frequently
  - May repeat 2x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients
- BENADRYL: as noted above
- ALBUTEROL: as noted above
- SOLU-MEDROL: as noted above

INFORMATION

- Symptoms of hypoglycemia
  - AMS
  - Slurred speech
  - Seizures
  - Coma
  - Irritability
- Symptoms of hyperglycemia with Diabetic Ketoacidosis (DKA) include:
  - Nausea/Vomiting
  - Abdominal pain
  - General weakness
  - Kussmaul respirations (deep, rapid respirations)
  - AMS
  - Hypotension
  - Tachycardia with an acetone smell on the patient's breath
- Diabetic patients taking oral hypoglycemic medications (e.g., Glyburide, Glimepiride, and Glipizide) should be transported if treated.

ADULT

HYPOGLYCEMIA: BGL < 60 mg/dL

- ORAL GLUCOSE:
  - 15g
  - May repeat 1x prn
  - Contraindication - Not conscious enough to swallow

AND/OR

- D10:
  - 100mL IV/IO
  - Retest glucose
  - May repeat 1x prn

HYPOGLYCEMIA: BGL < 60 mg/dL IN CARDIAC ARREST

- D10:
  - 250mL
    - Administer IV/IO utilizing a 15 gtt set, run wide open
  - Retest glucose
  - May repeat 1x prn

HYPERGLYCEMIA: BGL > 300 mg/dL WITH SIGNS & SYMPTOMS OF DKA

- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

PEDIATRIC

- Obtain a BGL
  - Neonates and Infants: Heel stick
  - Children: Finger stick

HYPOGLYCEMIA: BGL < 60 mg/dL

- ORAL GLUCOSE:
  - 15g
  - May repeat 1x prn
  - Contraindications:
    - Not conscious enough to swallow
    - < 2 years old

AND/OR

- D10:
  - 5mL/kg IV/IO
  - May repeat 1x prn

HYPOGLYCEMIA: BGL < 60 mg/dL IN CARDIAC ARREST

- Refer to "Handtevy" System for dose

HYPERGLYCEMIA: BGL > 300 mg/dL WITH SIGNS & SYMPTOMS OF DKA

- NORMAL SALINE:
  - 20mL/kg IV/IO, assess lung sounds and BP frequently
  - May repeat 2x prn, for BGL > 300 mg/dL
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

Dystonic Reaction

INFORMATION

- Dystonic reactions are characterized by intermittent, spasmodic, or sustained involuntary contractions of muscles in the:
  - Face
  - Neck
  - Trunk
  - Pelvis
  - Extremities
  - Larynx
- The following classes of medications are typically responsible for dystonic reactions:
  - Antipsychotic (e.g., DROPERIDOL, Haldol, Risperdal, etc.)
  - Antiemetic (e.g., Compazine, Reglan, Phenergan, etc.)
  - Antidepressant (e.g., Prozac, Paxil, etc.)
- A dystonic reaction can occur immediately or be delayed for hours to days.

ADULT

- BENADRYL:
  - 50mg IV/IO/IM, over 2 minutes for IV/IO usage
    - **Dilute** with 9mL of NORMAL SALINE for IV/IO administration

PEDIATRIC

- BENADRYL:
  - 1mg/kg IV/IO/IM, over 2 minutes for IV/IO usage. Max single dose 50mg
    - **Dilute** with 9mL of NORMAL SALINE for IV/IO administration
  - Contraindication - Neonates

Fluid Resuscitation/Dehydration

INFORMATION

- Indications for fluid resuscitation:
  - Hypotension
  - Fatigue
  - Dark color urine
  - Dry mouth
  - Headache
  - Prolonged vomiting and/or diarrhea
  - Suspected rhabdomyolysis
  - Paramedic discretion

ADULT

- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

PEDIATRIC

- NORMAL SALINE:
  - 20mL/kg IV/IO, assess lung sounds and BP frequently
  - May repeat 2x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

Hyperkalemia

INFORMATION

- Consider hyperkalemia in patients with a history of renal failure/dialysis who are pre-dialysis **AND** present with any of the following:
  - General weakness
  - Cardiac arrhythmias and/or ECG abnormalities:
    - Bradycardia
    - 2nd or 3rd Degree Heart Blocks
    - Really Wide Complex Tachycardia (RWCT)
    - Sine wave
    - Widening and/or bizarre QRS complex

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

PATIENT PRESENTING WITH ANY OF THE ABOVE CARDIAC ARRHYTHMIAS AND/OR ECG ABNORMALITIES

- CALCIUM CHLORIDE:
  - 1g IV/IO, over 2 minutes
  - Precaution - **DO NOT** administer in same IV/IO line as SODIUM BICARBONATE without thoroughly flushing
- ALBUTEROL:
  - 2.5mg via nebulizer
  - Continuous treatments (if an advanced airway is utilized, administer via in-line nebulization)
- SODIUM BICARBONATE:
  - 100mEq IV/IO, over 2 minutes
  - Precaution - **DO NOT** administer in same IV/IO line as CALCIUM CHLORIDE without thoroughly flushing

PATIENT IS HYPOTENSIVE

- NORMAL SALINE:
  - 500mL IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

WARNING

- **Hyperkalemia can cause death primarily through lethal cardiac arrhythmias. Wide QRS complexes are an ominous sign and must be treated with CALCIUM CHLORIDE immediately.**

PEDIATRIC

- Obtain 15 lead and 12 lead ECGs and leave cables connected.

PATIENT PRESENTING WITH ANY OF THE CARDIAC ARRHYTHMIAS AND/OR ECG ABNORMALITIES ON PREVIOUS PAGE

- CALCIUM CHLORIDE:
  - 20mg/kg IV/IO, over 2 minutes
  - Precaution - **DO NOT** administer in same IV/IO line as SODIUM BICARBONATE without thoroughly flushing
- ALBUTEROL:
  - 2.5mg via nebulizer
  - Continuous treatments (if an advanced airway is utilized, administer via in-line nebulization)
- SODIUM BICARBONATE:
  - 1mEq/kg IV/IO, over 2 minutes. Max single dose 50mEq
  - May repeat 1x prn, in 5 minutes. Max total dose 100mEq
  - Precaution - **DO NOT** administer in same IV/IO line as CALCIUM CHLORIDE without thoroughly flushing

PATIENT IS HYPOTENSIVE

- NORMAL SALINE:
  - 10mL/kg IV/IO. Assess lung sounds and BP frequently
  - May repeat 1x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

Medical Hemorrhagic Shock

INFORMATION

- Shock is defined as inadequate perfusion of blood and oxygen to the brain, heart, and other vital organs and tissues.
- Patients taking blood thinners or anticoagulants (e.g., Coumadin, Plavix, Pradaxa, Xarelto, Eliquis, etc.) have an increased potential for hemorrhagic shock.
- Examples of patients in Medical Hemorrhagic Shock include but are not limited to:
    - Gastrointestinal (GI) Bleed (e.g., esophageal varices, hemorrhaging per rectum, etc.)
    - Obstetrical Hemorrhage (e.g., placenta abruptio, uterine rupture, postpartum, etc.)
        - If the patient is hemorrhaging secondary to an Obstetrical emergency, refer to the "Hemorrhagic Shock in Pregnancy" protocol (p. 151)
    - Vascular (e.g., uncontrolled bleeding from shunt, fistula, etc.)
    - Recent major surgery

ADULT & PEDIATRIC

- Control all major external bleeding
- Patient's body temperature shall be maintained with blankets
    - Consider increasing the temperature in the patient compartment
- Establish bilateral vascular access utilizing largest catheter size possible

IF PATIENT MEETS WHOLE BLOOD TRANSFUSION/TXA CRITERIA

- EMS Captain shall be contacted
- Refer to the "Whole Blood Transfusion/TXA" protocol (pp. 129-130) for WHOLE BLOOD and TRANEXAMIC ACID (TXA) administration procedure
    - Administer TRANEXAMIC ACID (TXA) with or without WHOLE BLOOD

PATIENT MEETS WHOLE BLOOD TRANSFUSION/TXA CRITERIA AND WHOLE BLOOD/TXA IS NOT AVAILABLE

- NORMAL SALINE should **ONLY** be given when WHOLE BLOOD/TXA is not available
- NORMAL SALINE (WARMED NORMAL SALINE is preferred):
    - IV fluids should be given at a rate (boluses) necessary to maintain peripheral pulses (which is typically a SBP of 80-90 mmHg)

Consideration to WHOLE BLOOD administration should be given to patients who are prescribed Beta Blockers and/or Calcium Channel Blockers with a HR < 110 beats per minute.

WARNING
TXA SHALL NOT be administered to patients with suspected GI bleeds.

Nausea/Vomiting

INFORMATION

- Consider differential diagnosis:
  - Cardiac
  - Stroke
  - Diabetic
  - Head Injury
  - Other

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected
- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
- ZOFRAN:
  - 4mg IV/IO/IM/PO, over 2 minutes for IV/IO usage
  - May repeat 1x prn

PEDIATRIC

- Obtain 15 lead and 12 lead ECGs and leave cables connected
- NORMAL SALINE:
  - 20mL/kg IV/IO, assess lung sounds and BP frequently
  - May repeat 2x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients
- ZOFRAN:
  - 0.1mg/kg IV/IO/IM/PO, over 2 minutes for IV/IO usage. Max single dose 4mg

Seizure

INFORMATION

- Consider the possible causes:
  - Meningitis
  - Fever
  - Head trauma
  - Hemorrhagic stroke
  - Drugs
  - Alcohol
  - Diabetic
  - Poisoning
- Monitoring of $EtCO_2$ shall be performed to determine the patient's respiratory status.
- Refer to the "Pre-Eclampsia/Eclampsia" protocol (p. 150) for a pregnant patient.

ADULT

IF ACTIVELY SEIZING

- OXYGEN ADMINISTRATION:
  - 15 LPM via NRB regardless of SpO_2
  - Leave OXYGEN in place throughout postictal period
- VERSED:
  - 5mg IV/IO/IN/IM
  - May repeat 1x prn, in 5 minutes if seizure reoccurs or does not subside
  - Contraindication - Hypotension
  - Precautions:
    - Monitor for respiratory depression
    - Intranasal medication administration is the preferred route when vascular access is not already established

MAD TIPS

- **Suction nares prior to IN administration of medications when secretions are present.**
- **Rapidly depress syringe plunger to atomize medications.**
- **When possible, split medication between both nares.**

IF SEIZURE DOES NOT RESPOND TO ABOVE TREATMENT

- KETAMINE INFUSION:
  - **Dilute**: 100mg of KETAMINE in a 50mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
    - Administer entire dose regardless if seizure terminates with partial dose of KETAMINE
  - Contraindications:
    - Pregnant
    - Penetrating eye injury
    - Non-traumatic chest pain
  - Precautions:
    - Be prepared for advanced airway management. Refer to "Delayed Sequence Induction" protocol (pp. 59-61)
    - May increase schizophrenic symptoms

OR

IF UNABLE TO ESTABLISH VASCULAR ACCESS

- KETAMINE:
  - 100mg IN/IM
  - Contraindications - as noted above
  - Precautions - as noted above

PEDIATRIC

FEBRILE SEIZURE

- PASSIVE COOLING: Remove the clothing
- **DO NOT** cover patient with a wet towel or sheet
- **DO NOT** apply ice or cold packs to the patient's body

IF ACTIVELY SEIZING

- OXYGEN ADMINISTRATION:
  - 15 LPM via NRB regardless of SpO_2
  - Leave OXYGEN in place throughout postictal period
- VERSED:
  - 0.1mg/kg IV/IO. Max single dose 5mg
  - 0.2mg/kg IN/IM. Max single dose 5mg
  - May repeat either route 1x prn, in 5 minutes if seizure reoccurs or does not subside
  - Contraindication - Hypotension
  - Precautions:
    - Monitor for respiratory depression
    - Intranasal medication administration is the preferred route when vascular access is not already established

IF SEIZURE DOES NOT RESPOND TO ABOVE TREATMENT

- KETAMINE:
  - 2mg/kg IN/IM. Max single dose 100mg
  - Administer entire dose regardless if seizure terminates with partial dose of KETAMINE
  - Contraindications:
    - Penetrating eye injury
  - Precautions:
    - Be prepared for advanced airway management. Refer to "Delayed Sequence Induction" protocol (pp. 59-61)
    - May increase schizophrenic symptoms

Sepsis

INFORMATION

- Sources, signs, and symptoms of sepsis include, but are not limited to:
  - Fever
  - UTI (Increased urinary frequency, dysuria, and/or cloudy, bloody, or foul smelling urine)
  - Pneumonia (productive cough, green/yellow/brown sputum)
  - Wounds or insertion sites that are: painful/red/swollen/purulent (pus) discharge
  - Patient is on antibiotics and has significant diarrhea, abdominal pain, and/or tenderness
  - Recent history of surgery/invasive medical procedure (e.g., foley catheter, central lines, etc.)
  - AMS and/or poor oral intake over the past 24-48 hours (especially in the elderly)
  - Bed sores, abscesses, cellulitis, or immobility
- Transport all Sepsis Alerts as Priority 2.

ADULT & PEDIATRIC

Sepsis Alert Criteria

If all of the following are met, call a Sepsis Alert:

- **NOT** pregnant
  AND
- Suspected or documented infection
  AND
- At least **TWO (2) POINTS** of the **H.A.T.** criteria (max score of 3 points)
  - **H-** Hypotension = **1 point**
    - Adult: SBP < 100 mmHg
    - Pediatric: SBP - Refer to the "Handtevy" system for age appropriate hypotension
  - **A-** Altered Mental Status or GCS ≤ 14 (new onset) = **1 point**
  - **T-** Tachypnea = **1 point**
    - Adult:
      - Respiratory rate > 22
        AND/OR
      - $EtCO_2$ (< 25 mmHg)
    - Pediatric:
      - Respiratory rate - Refer to the "Handtevy" system for age appropriate tachypnea
        AND/OR
      - $EtCO_2$ (< 25 mmHg)

WARNING

It is imperative, once sepsis is identified, that the patient is kept from becoming hypotensive. An episode of hypotension significantly increases morbidity and mortality.

WARNING

- **Pneumonia patients with rales still require IV fluids**
- **Monitor $EtCO_2$ and SpO_2 during fluid administration**

ADULT

SEPSIS ALERT

- CEFTRIAXONE INFUSION (ROCEPHIN) (administer both antibiotics unless contraindicated):
  - Reconstitute 2g of CEFTRIAXONE using 20mL of NORMAL SALINE in the medication vial
  - **Dilute**: 2g of CEFTRIAXONE in a 50mL bag of NORMAL SALINE
    - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)
  - Contraindication - Allergy to Cephalosporin antibiotics (e.g., Ancef, Ceclor, Cefdinir, Keflex)
- GENTAMICIN (administer both antibiotics unless contraindicated):
  - 80mg IM
  - Contraindication - Allergy to Aminoglycoside antibiotics (e.g., Paromycin, Tobramycin, Neomycin)
- NORMAL SALINE:
  - 1L IV/IO, regardless of blood pressure, assess lung sounds frequently
  - Repeat 1x if time permits
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

IF PATIENT IS HYPOTENSIVE

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain SBP 100mmHg. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration

PEDIATRIC

SEPSIS ALERT

- CEFTRIAXONE INFUSION (ROCEPHIN) (administer both antibiotics unless contraindicated):
  - Reconstitute 2g of CEFTRIAXONE using 20mL of NORMAL SALINE in the medication vial
  - **Dilute**: 50mg/kg of CEFTRIAXONE in a 50mL bag of NORMAL SALINE. Max single dose 2g
    - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)
  - Contraindications:
    - Allergy to Cephalosporin antibiotics (e.g., Ancef, Ceclor, Cefdinir, Keflex)
    - Neonates
- GENTAMICIN (administer both antibiotics unless contraindicated):
  - 2.5mg/kg IM. Max single dose 80mg
  - Contraindication - Allergy to Aminoglycoside antibiotics (e.g., Paromycin, Tobramycin, Neomycin)
- NORMAL SALINE:
  - 20mL/kg IV/IO, regardless of blood pressure, assess lung sounds frequently
  - May repeat 2x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

IF PATIENT IS HYPOTENSIVE (AGE APPROPRIATE HYPOTENSION)

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain age appropriate SBP. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - **DO NOT** administer faster than 1mL/minute
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration

INFORMATION

STROKE ALERT CRITERIA

- Any new positive findings (unrelated to the effects of drugs/alcohol) on the following assessments:
  - B.E. - F.A.S.T Scale ≤ 24 hours
    - **Exception**: Stroke Alert can be called up to 48 hours for any new positive finding that meets the "B-balance" **OR** "E-eyes" criteria from the B.E. - F.A.S.T Scale
  - R.A.C.E. "+" (plus) assessment score > 0
  - Onset time of symptoms is unknown

ASSESSMENTS

- B.E. - F.A.S.T Scale shall be the initial stroke assessment
- If stroke is suspected, the patient shall receive a R.A.C.E. "+" (plus) assessment
- Consider AEIOU-TIPS for differential diagnosis

BE-FAST STROKE ASSESSMENT (NEW ONSET OF ANY OF THE FOLLOWING SYMPTOMS)

- **B - BALANCE:**
  - Trouble walking, loss of coordination
- **E - EYES:**
  - Trouble seeing, blurred vision, loss of vision
- **F - FACE:**
  - Droop, numbness, asymmetrical
- **A - ARM:**
  - Unilateral paralysis or numbness, unequal strength/weakness
- **S - Speech:**
  - Slurred, aphasia, inappropriate
- **T - Time:**
  - Document last time seen normal and associated symptoms

	ITEM	ASSESSMENT	R.A.C.E. "+" (plus) SCORE
MOTOR	Facial Palsy	Ask the patient to show their teeth: "Smile"	0 – Absent (symmetrical movement) 1 – Mild (slightly asymmetrical) 2 – Moderate to Severe (completely asymmetrical)
	Arm Motor Function	Extend the arms of the patient 90 degrees (if sitting) or 45 degree (if supine) palms up	0 – Normal to mild (limb upheld > 10 seconds) 1 – Moderate (limb upheld < 10 seconds) 2 – Severe (patient unable to raise arms against gravity)
	Leg Motor Function	Extend the leg of the patient 30 degrees (if supine) 1 leg at a time	0 – Normal to mild (limb upheld > 5 seconds) 1 – Moderate (limb upheld < 5 seconds) 2 – Severe (patient unable to raise leg against gravity)
CORTICAL	Head and Eye Gaze Deviation	Observe range of motion of eyes and look for head turning to 1 side	0 – Absent (normal eye movement to both sides, and no head deviation was observed) 1 – Present (eyes and/or head deviation to 1 side was observed)
	Aphasia	Ask the patient to follow 2 verbal orders: "Close your eyes" and "Make a fist"	0 – Normal (performs both tasks correctly) 1 – Moderate (performs 1 task correctly) 2 – Severe (performs neither task)
	Agnosia	Ask the patient: "Who's arm is this?" when showing him or her the weak arm or "Can you move your arm?"	0 – Normal appropriate or correct answer 1 – Moderate (does not recognize limb or cannot move it) 2 – Severe (both of them)
If Cortical Signs are present add a "+" (plus) sign next to total score and include the verbiage "plus" with encode.			R.A.C.E. SCALE TOTAL: **Max Score of 11**

ADULT & PEDIATRIC

- Obtain the following information:
  - Last time seen asymptomatic
  - Witness name
  - Witness phone number(s)
  - Patient's medications
- OBTAIN A BGL:
  - If BGL < 60 mg/dL , refer to "Diabetic Emergencies" protocol (pp.37-38) and reassess
  - If stroke symptoms persist after BGL is corrected, continue stroke treatment
- POSITIONING:
  - Supine:
    - All patients with the exception of those listed under 30° head elevation
  - 30° head elevation:
    - A diagnosed intracerebral hemorrhage (inter-facility transport)
    - Patient is short of breath
- OXYGEN:
  - 2 LPM NC, regardless of pulse oximetry reading. Increase oxygen therapy as needed
- IV ACCESS:
  - Adult:
    - Establish an 18g catheter or larger, if possible
      - The antecubital is preferred
  - Pediatric:
    - Establish an appropriate sized catheter
      - The antecubital is preferred
- NORMAL SALINE:
  - Adult:
    - 500mL IV/IO, regardless of the blood pressure
  - Pediatric:
    - 10mL/kg IV/IO, regardless of the blood pressure. Max dose 250mL

TRANSPORT

- Immediate notification of a Stroke Alert shall be relayed to the **RECEIVING STROKE CENTER** along with the following information:
  - Any new positive findings from the B.E. - F.A.S.T scale
  - RACE "+" (plus) score
- The person who witnessed the onset of stroke symptoms should accompany the patient to the receiving facility when possible.
- Adult:
  - All Stroke Alerts shall only be transported to a **COMPREHENSIVE STROKE CENTER**
    - **Exception: Known terminal illness or Hospice Care patients can still be treated as a STROKE ALERT. Transport these patients to the closest Stroke Center (Primary OR Comprehensive).**
- Pediatric:
  - **ALL** pediatric Stroke Alerts shall be transported to St. Mary's Comprehensive Stroke Center

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Respiratory Emergencies

Acute Asthma (pp. 55-56)

Chronic Obstructive Pulmonary Disease (p. 57)

Croup/Epiglottitis (p. 58)

Delayed Sequence Induction (pp. 59-61)

Pneumonia (p. 62)

Tracheostomy Management (pp. 63-64)

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Acute Asthma

INFORMATION

- Acute Asthma is characterized by a sudden onset of shortness of breath, nonproductive coughing, and wheezing resulting in acute bronchoconstriction and acute inflammation.
- Asthma attacks may be triggered by any of the following:
  - Atmospheric pollutants
  - Exercise
  - Cold air
  - Pet dander
  - Stress
  - Upper respiratory infection
  - Diabetic medications
- Acute Asthma most often presents in younger patients as a reversible airway obstruction.
- Patients with COPD & Asthma have prolonged exhalation secondary to bronchospasm. This causes air trapping resulting in hypercapnia (high levels of CO_2). Therefore, $EtCO_2$ guidelines should be disregarded for these patients, as it is more important to maintain SpO_2 levels ≥ 90%.

ADULT

BRONCHOSPASM SECONDARY TO ACUTE ASTHMA

- ALBUTEROL:
  - 2.5mg via nebulizer. May be administered simultaneously with CPAP
  - May repeat prn
- SOLU-MEDROL:
  - 125mg IV/IO/IM/PO, over 2 minutes for IV/IO usage

MODERATE OR SEVERE RESPIRATORY DISTRESS

- CPAP 5cmH_2O:
  - May increase the PEEP setting to 10cmH_2O to optimize SpO_2 and $EtCO_2$ readings
  - Contraindications:
    - SBP < 90 mmHg
    - Without spontaneous respirations
    - Decreased LOC (lethargic)
    - < 30 kg

SEVERE ASTHMA NOT RESPONDING TO ABOVE TREATMENT

- EPINEPHRINE (1:1,000, 1mg/mL):
  - 0.3mg (0.3mL) IM
  - May repeat 2x prn, in 5 minute intervals
- MAGNESIUM SULFATE INFUSION:
  - **Dilute**: 2g of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
    - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension

ASTHMA PATIENT WHO DEVELOPS POOR BAG COMPLIANCE OR HYPOTENSION DURING POSITIVE PRESSURE VENTILATIONS

- Temporarily disconnect BVM and allow patient to exhale for:
  - Adults: 20-40 seconds

WARNING

- **Immediately remove the CPAP for any patient whose condition worsens after applying the CPAP.**
- **The administration of ROCURONIUM for Acute Asthma is CONTRAINDICATED.**

PEDIATRIC

BRONCHOSPASM SECONDARY TO ACUTE ASTHMA

- ALBUTEROL:
  - 2.5mg via nebulizer
  - May repeat prn
- SOLU-MEDROL:
  - 2mg/kg IV/IO/IM/PO, over 2 minutes for IV/IO usage. Max single dose 125mg

SEVERE ASTHMA NOT RESPONDING TO ABOVE TREATMENT

- EPINEPHRINE (1:1,000, 1mg/mL):
  - 0.01mg/kg IM. Max single dose 0.3mg
  - May repeat 2x prn, in 5 minute intervals.
- MAGNESIUM SULFATE INFUSION:
  - **Dilute**: 40mg/kg of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
    - Administer over 25 minutes IV/IO by utilizing a 15 gtt set delivering 30gtts/min (1gtts/2sec)
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension

ASTHMA PATIENT WHO DEVELOPS POOR BAG COMPLIANCE OR HYPOTENSION DURING POSITIVE PRESSURE VENTILATIONS

- Temporarily disconnect BVM and allow patient to exhale for:
  - Pediatrics: 10-20 seconds

Chronic Obstructive Pulmonary Disease

INFORMATION

- Chronic Obstructive Pulmonary Disease (COPD) refers to a group of diseases that include:
  - Chronic asthma
  - Chronic bronchitis
  - Chronic emphysema
- COPD presents as shortness of breath, chronic productive cough, and wheezing resulting in chronic bronchoconstriction and chronic inflammation.
- COPD is differentiated from Acute Asthma in that COPD most often presents in older patients.
  - COPD is a long-term, progressive disease of declining lung function observed mainly in older adults.
- COPD is not fully reversible but the symptoms may be successfully managed with medications.

ADULT

BRONCHOSPASM SECONDARY TO COPD

- ALBUTEROL:
  - 2.5mg via nebulizer. May be administered simultaneously with CPAP
  - May repeat prn
- SOLU-MEDROL:
  - 125mg IV/IO/IM/PO, over 2 minutes for IV/IO usage

MODERATE OR SEVERE RESPIRATORY DISTRESS

- CPAP 5cmH_2O:
  - May increase the PEEP setting to 10cmH_2O to optimize SpO_2 and $EtCO_2$ readings
  - Contraindications:
    - SBP < 90 mmHg
    - Without spontaneous respirations
    - Decreased LOC (lethargic)
    - < 30 kg

COPD PATIENT WHO DEVELOPS POOR BAG COMPLIANCE OR HYPOTENSION DURING POSITIVE PRESSURE VENTILATIONS

- Temporarily disconnect BVM and allow patient to exhale for:
  - Adults: 20-40 seconds

WARNING

Immediately remove the CPAP for any patient whose condition worsens after applying the CPAP.

Croup/Epiglottitis

INFORMATION

- Croup and epiglottitis are potentially life-threatening pediatric emergencies. While these medical conditions may present with similarities, they have distinct differences that can be assessed.
- Croup is commonly caused by a viral infection that results in an upper airway obstruction through edema of the upper airway.
- Epiglottitis is most commonly caused by a bacterial infection. This results in profound swelling of the upper airway, which can lead to asphyxia and respiratory arrest.
- Nebulized EPINEPHRINE, via its alpha-1 effect of vasoconstriction, is a highly effective treatment for upper airway obstruction that is caused by both croup and epiglottitis.
- ALBUTEROL does not have significant alpha-1 effects, making it ineffective for croup and epiglottitis. In addition, its beta effect could potentially cause vasodilation and theoretically worsen upper airway edema.

PEDIATRIC

CROUP/EPIGLOTTITIS

- EPINEPHRINE (1:1,000, 1mg/mL):
  - 3mg (3mL total) delivered via nebulizer
  - Precautions:
    - **DO NOT** stress the patient
    - **DO NOT** attempt to intubate or place an OPA or NPA
- Ventilate via BVM as needed
- Expedite transport to closest Comprehensive Pediatric Emergency Department (CPED)
  - If ground transport to a CPED is > 40 minutes, transport to the closest APED

Croup:	Epiglottitis:
• Usually < 3 years old • Low grade fever • Non-toxic appearing • Slow progression of sickness	• Usually 3-6 years old • Sudden onset • High grade fever • Poor general impression • Drooling • Tripod position

WARNING

ALBUTEROL should be avoided if either croup or epiglottitis is suspected.

Delayed Sequence Induction

INFORMATION

- Delayed Sequence Induction (DSI) consists of the administration of a specific sedative agent that does not blunt spontaneous ventilations or airway reflexes.
- The primary goal of any airway or respiratory emergency is to maintain:
  - Ventilation, Oxygenation, and Perfusion
- Indications for DSI include but are not limited to the following:
  - Airway protection and patency
  - Respiratory failure
  - Prolonged respiratory support

ADULT & PEDIATRIC

PREPARATION FOR PROCEDURE

- Suction must be turned on and placed within arms reach for the duration of the procedure
- The following must be monitored prior to and for the duration of the procedure:
  - Heart Rate
  - Blood Pressure
  - Cardiac Monitoring
  - SpO_2
  - $EtCO_2$
  - Respiratory Rate

PREMEDICATE

- Adult:
  - KETAMINE INFUSION:
    - **Dilute:** 200mg of KETAMINE in a 50mL bag of NORMAL SALINE
      - Administer IV/IO utilizing a 60 gtt set, run wide open
    - May repeat 1x prn, for induction
    - Contraindication - Pregnant
  - ETOMIDATE: (**ONLY** use when KETAMINE is contraindicated **OR** unavailable)
    - 30mg IV/IO, over 30-60 seconds
    - May repeat 1x prn, for induction
- Pediatric:
  - KETAMINE INFUSION:
    - **Dilute**: 2mg/kg of KETAMINE in a 50mL bag of NORMAL SALINE. Max single dose 200mg
      - Administer IV/IO utilizing a 60 gtt set, run wide open
    - May repeat 1x prn, for induction
  - ETOMIDATE: (**ONLY** use when KETAMINE is contraindicated **OR** unavailable)
    - 0.3mg/kg IV/IO, over 30-60 seconds
    - May repeat 1x prn, for induction

POSITIONING

- Align ear to sternal notch and face parallel with ceiling
- Modified jaw thrust for suspected spinal injury
- Elevate the head of stretcher 15-30 degrees when possible

PREOXYGENATE

- SpO_2 should be ≥ 93% and maintained for 3 minutes
- Nasal Cannula at 15 LPM
- Attach PEEP valve to exhalation port of BVM, set to 10cmH_2O
  - Contraindications:
    - Trauma
    - Hypotension
- Maintain a two handed face seal with BVM
- **DO NOT** assist ventilations unless the patient becomes apneic (respiratory rate ≤4 per minute)
- If unable to achieve SpO_2 ≥ 93% for 3 minutes, **ABORT** procedure and place Supraglottic Airway (SGA)

PERFUSION

- If normotensive, proceed with intubation
- If hypotensive, correct blood pressure and proceed with intubation
- NORMAL SALINE:
  - Adult:
    - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
    - May repeat 1x prn
    - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
  - Pediatric:
    - 20ml/kg IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
    - May repeat 1x prn
    - Precaution - As noted above
- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - Adult & Pediatric:
    - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
      - Administer 1mL/minute IV/IO
      - Titrate to maintain SBP 100 mmHg for adults and age appropriate SBP for pediatrics. Max total dose 300mcg (30mL)
    - Contraindication - Hypotension secondary to blood loss
    - Precautions:
      - Rapid (< 2 minutes) onset, short (5-10 minute) duration
      - Monitor heart rate and blood pressure throughout administration
- If unable to correct hypotension, **ABORT** procedure, place SGA, and expedite transport

PARALYSIS IF INDICATED (INDICATIONS: APNEIC STATUS EPILEPTICUS, TRISMUS, EMS CAPTAIN OR FLIGHT CREW DISCRETION)

- ROCURONIUM:
  - Adult:
    - 100mg IV/IO
    - May repeat 1x prn
    - Contraindication - Acute Asthma, hypersensitivity/allergy, predicted difficult intubation, major facial or laryngeal trauma, or a patient who cannot be ventilated with a BVM
  - Pediatric:
    - 1mg/kg IV/IO. Max single dose 100mg
    - May repeat 1x prn
    - Contraindication - As noted above

PROCEED WITH INTUBATION

- Suction the airway prior to placing Endotracheal Tube (ETT)
- King Vision is the preferred method
- Max of 2 attempts
- If the patient desaturates or becomes hypotensive during the procedure, immediately stop the procedure, correct the issue, then proceed with intubation
- If unable to place ETT after 2 attempts, **ABORT** procedure, place SGA, and expedite transport

PROOF OF PLACEMENT

- $EtCO_2$ is required initially, continuously, and upon transfer of care
- Confirm correct placement by the presence of no less than 3 continuous "box-like" capnographic waveforms
- Auscultate for presence of bilateral breath sounds
- A gastric tube should be placed after airway placement is confirmed

POST-INTUBATION MANAGEMENT

- Post-intubation medications are **MANDATORY** for **ANY** induction procedure, ETT or SGA
- Based on clinical presentation, **ANY OR ALL** of the following medications may be used:
- KETAMINE INFUSION:
    - Adult:
        - **Dilute:** 200mg of KETAMINE in a 50mL bag of NORMAL SALINE
            - Administer IV/IO utilizing a 60 gtt set, run wide open
        - May repeat 1x prn, for post intubation sedation
        - Contraindication - Pregnant
    - Pediatric:
        - **Dilute:** 2mg/kg in a 50mL bag of NORMAL SALINE. Max single dose 200mg
            - Administer IV/IO utilizing a 60 gtt set, run wide open
        - May repeat 1x prn, for post intubation sedation

AND/OR

- VERSED:
    - Adult:
        - 5mg IV/IO
        - May repeat 1x prn
        - Contraindication - Hypotension
    - Pediatric:
        - 0.1mg/kg IV/IO. Max single dose 5mg
        - May repeat 1x prn
        - Contraindication - Hypotension

AND

- FENTANYL: (**SHALL NOT** be administered without KETAMINE or VERSED)
    - Adult:
        - 100mcg IV/IO
        - May repeat 1x prn
        - Contraindication - Pregnancy near term ≥ 32 weeks or in active labor
    - Pediatric:
        - 1mcg/kg IV/IO, over 2 minutes. Max single dose 100mcg
        - May repeat 1x prn, in 5 minutes. Max total dose 200mcg
        - Contraindication - ≤ 6 months old

DIFFICULT AIRWAY

- If unable to successfully place ETT or SGA, ventilate with BVM/NPAs/OPA
- If above interventions are unsuccessful, perform cricothyrotomy
    - Needle cricothyrotomy : age ≤ 12 years old
    - Surgical cricothyrotomy: ≥ 13 years old

Pneumonia

INFORMATION

- Respiratory infections are the most common cause of sepsis. Any patient who has a respiratory infection should additionally be assessed for Sepsis Alert criteria.
- Pneumonia is an acute lower respiratory tract infection and may present with any or all of the following:
  - Pleuritic chest pain
  - Shortness of breath
  - Productive cough
  - Fever
  - General weakness
  - Wheezing
  - Rhonchi
  - Altered mental status

ADULT

BRONCHOSPASM OR RHONCHI SECONDARY TO SUSPECTED PNEUMONIA

- ALBUTEROL:
  - 2.5mg via nebulizer. May be administered simultaneously with CPAP
  - May repeat prn
- SOLU-MEDROL:
  - 125mg IV/IO/IM/PO, over 2 minutes for IV/IO usage

MODERATE OR SEVERE RESPIRATORY DISTRESS

- CPAP 5cmH_2O:
  - May increase the PEEP setting to 10cmH_2O to optimize SpO_2 and $EtCO_2$ readings
  - Contraindications:
    - SBP < 90 mmHg
    - Without spontaneous respirations
    - Decreased LOC (lethargic)
    - < 30 kg

PATIENT THAT MEETS SEPSIS ALERT CRITERIA

- Refer to the "Sepsis" protocol (pp. 47-49), if applicable

PEDIATRIC

BRONCHOSPASM OR RHONCHI SECONDARY TO SUSPECTED PNEUMONIA

- ALBUTEROL:
  - 2.5mg via nebulizer
  - May repeat prn
- SOLU-MEDROL:
  - 2mg/kg IV/IO/IM/PO, over 2 minutes for IV/IO usage. Max single dose 125mg

PEDIATRIC PATIENT THAT MEETS SEPSIS ALERT CRITERIA

- Refer to the "Sepsis" protocol (pp. 47-49), if applicable

WARNING

Immediately remove the CPAP for any patient whose condition worsens after application.

Tracheostomy Management

INFORMATION

- Utilize the primary caregiver as a resource on scene whenever possible.
- One of the most common causes of an airway obstruction in these patients is a mucous plug.
- Patients with tracheostomies often are unable to speak. Use the following signs and symptoms to determine respiratory distress:
  - Altered Mental Status
  - Cyanosis
  - Tachycardia/Tachypnea
  - Labored breathing
  - Low pulse oximetry
  - High capnometry
  - Grunting, snoring, gurgling, or stridor
  - Accessory muscle use
  - Decreased or absent breath sounds

ADULT & PEDIATRICS

Troubleshooting the Tracheostomy:
Consider "D.O.P.E.S"
- **Dislodgement**
- **Obstruction**
- **Pneumothorax**
- **Equipment Failure**
- **Stacked Breaths**

INITIAL MANAGEMENT

- Apply OXYGEN via NRB Mask over tracheostomy site or attach a BVM directly to tracheostomy and ventilate if spontaneous respirations are absent.
- If there is a speaking valve, cap, or plug in place, remove it and reassess

DUAL CANNULA TRACHEOSTOMY MANAGEMENT

- Dual cannula tracheostomy is the most common type
  - Refer to following page for identification
- Remove the inner cannula only and clean mucous from inner cannula with NORMAL SALINE
  - If this resolves the issue, replace the inner cannula after it has been cleaned with NORMAL SALINE

INITIAL MANAGEMENT IS UNSUCCESSFUL

- Attempt deep tracheal suctioning through outer cannula with French suction catheter
- Reduce suction to low setting
- Limit suction to 10 seconds per attempt
- Suction catheter should be 50% the size of the tube
- Suction on way out, using a twisting motion

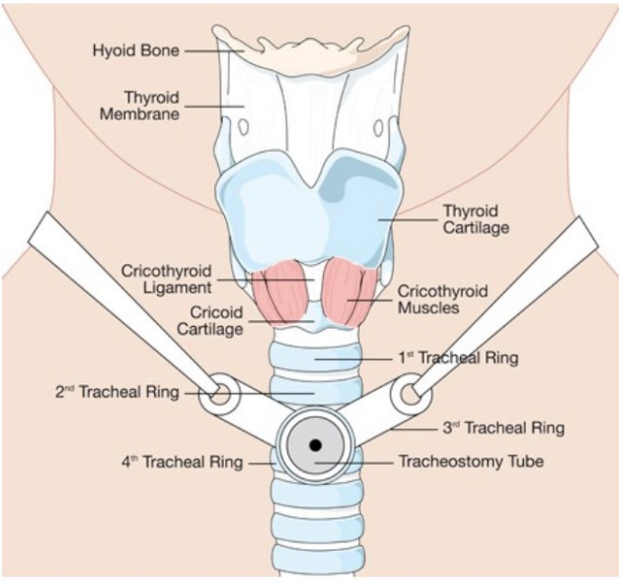
DEEP TRACHEAL SUCTIONING IS UNSUCCESSFUL

- Consider deflating the tracheostomy cuff (if present) and reattempt ventilation via tracheostomy

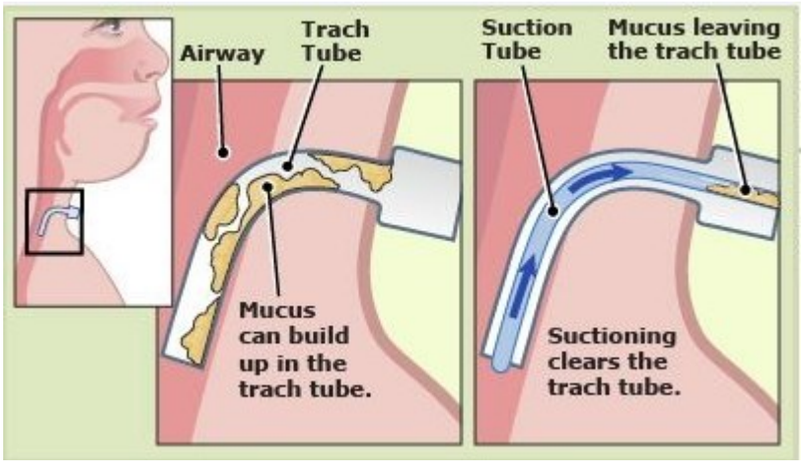
DIFFICULT MANAGEMENT OF TRACHEOSTOMY

- If still unable to ventilate, consider inserting a bougie into the trachea through the outer cannula.
- Completely remove the entire outer cannula from the trachea while maintaining the bougie in place.
- Gently insert a Quick Fix over the bougie and into the trachea
- Only advance a few inches
- Remove the bougie
- Ventilate with a BVM
- Confirm Quick Fix placement with $EtCO_2$ and secure
- If all above attempts at ventilating the patient fail, place the BVM directly over the stoma and ventilate
  - Refer to the "Delayed Sequence Induction" protocol (pp. 59-61)
  - If an SGA is utilized, ensure the stoma is manually covered during ventilations

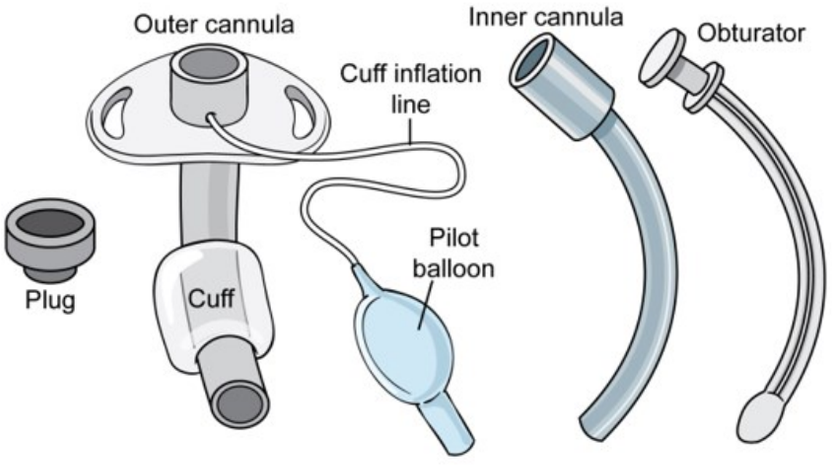
Anatomy



Mucus Plug



Components of Dual Cannula Tracheostomy Shiley



Cardiac Emergencies

A-Fib & A-Flutter (p. 67)

Bradycardia (pp. 68-69)

Cardiogenic Shock (p. 70)

Chest Pain (p. 71)

STEMI Alert (pp. 72-73)

Congestive Heart Failure (p. 74)

Supraventricular Tachycardia (pp. 75-76)

Wide Complex Tachycardia (pp. 77-78)

Really Wide Complex Tachycardia (pp. 79-80)

Polymorphic V-Tach/Torsades de Pointes (pp. 81-82)

Left Ventricular Assist Device (pp. 83-84)

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Atrial Fibrillation & Atrial Flutter

INFORMATION

ECG features that favor a diagnosis of:

Atrial Fibrillation:

- Irregularly irregular
- No discernable "P" waves
- Variable ventricular rate
- QRS complex usually < 0.12 unless a pre-existing bundle branch block is present

Atrial Flutter:

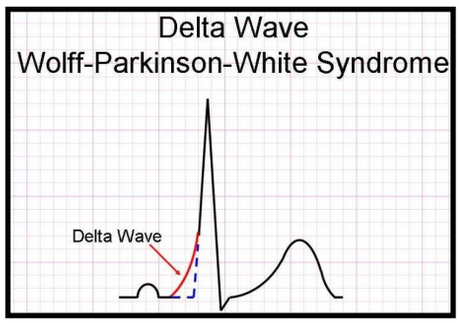
- Regular QRS complexes
- "Saw-tooth" pattern of inverted flutter waves in leads II, III, and aVF
- Upright flutter waves in V1
- QRS < 0.12

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

STABLE (RATE > 150 BEATS PER MINUTE)

- CARDIZEM INFUSION:
  - **Dilute:** 10mg of CARDIZEM in a 50 mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
  - If no response in 5 minutes, repeat dilution and administration above with 15mg IV/IO
  - Contraindications:
    - Hypotension
    - QRS width > 0.12 (3 small boxes)
    - History of WPW
    - Sick sinus syndrome
    - Heart blocks
  - Precautions:
    - Use with caution for patients taking beta blockers
    - May cause hypotension, see treatment below



UNSTABLE (RATE > 150 BEATS PER MINUTE WITH HYPOTENSION)

- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

PATIENT REMAINS HYPOTENSIVE AFTER FLUID ADMINISTRATION

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain SBP 100 mmHg. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration

PATIENT BECOMES NORMOTENSIVE AFTER FLUID ADMINISTRATION OR PUSH-DOSE PRESSOR EPINEPHRINE

- CARDIZEM: as noted above

CARDIZEM INDUCED HYPOTENSION

- NORMAL SALINE: as noted above
- CALCIUM CHLORIDE:
  - 500mg IV/IO, over 2 minutes

WARNING

DO NOT cardiovert A-Fib/A-Flutter. Cardioversion of unstable A-Fib/A-Flutter may put patient at a high risk for embolic stroke.

PEDIATRIC

- Call for orders

Bradycardia

INFORMATION

- Bradycardia is defined as a heart rate < 50 beats per minute.

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

WARNING
Go directly to transcutaneous pacing for unstable bradycardia in the presence of a myocardial infarction as ATROPINE increases myocardial ischemia and may increase the size of the infarct.

STABLE

- Monitor and transport

UNSTABLE (HYPOTENSION ONLY)

- ATROPINE:
  - 0.5mg IV/IO, over 1 minute
  - May repeat prn, in 3 minute intervals. Max total dose 3mg
  - Contraindication - Bradycardia in the presence of a myocardial infarction
- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

UNSTABLE (HYPOTENSION AND ANY OF THE FOLLOWING: ALTERED MENTAL STATUS, DETERIORATING CONDITION, NO RESPONSE TO AT LEAST 2 DOSES OF ATROPINE, OR ATROPINE CONTRAINDICATION)

- TRANSCUTANEOUS PACING:
  - Initial rate of 60 beats per minute and increase milliamps until capture is gained
  - Increase the rate as needed until the patient is hemodynamically stable
    - Max total rate 100 beats per minute
    - Max total milliamps 200mA

SEDATION FOR TRANSCUTANEOUS PACING

- **DO NOT** delay transcutaneous pacing to establish IV access
- ETOMIDATE: (preferred sedation medication)
  - 6mg IV/IO, administer over 30 seconds
  - May repeat 1x prn

OR

- VERSED: (if unable to establish vascular access)
  - 5mg IN/IM
  - May repeat 1x prn, in 5 minutes
  - Contraindication - Hypotension
  - Precaution - Monitor for respiratory depression

PATIENT REMAINS HYPOTENSIVE AFTER ATROPINE OR TRANSCUTANEOUS PACING

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain SBP 100 mmHg. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration
- NORMAL SALINE: as noted above

PEDIATRIC

- Obtain 15 lead and 12 lead ECGs and leave cables connected

STABLE

- OXYGENATION:
  - Ensure adequate oxygenation first, as hypoxia is most likely to be the cause of the bradycardia
- Monitor and transport

UNSTABLE (AMS AND AGE APPROPRIATE HYPOTENSION)

- Ensure adequate oxygenation and ventilation first, as hypoxia is most likely to be the cause of the bradycardia
- VENTILATION:
  - 1 ventilation every 3 seconds for at least 1 minute
- CHEST COMPRESSIONS: (If patient remains unstable after ventilations and heart rate remains < 60 BPM)
  - 220 compressions every 2 minutes

NO RESPONSE TO OXYGENATION, VENTILATION, AND CHEST COMPRESSIONS

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain age appropriate SBP. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - **DO NOT** administer faster than 1mL/minute
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration
- NORMAL SALINE:
  - 20mL/kg IV/IO. Assess lung sounds and BP frequently
  - May repeat 2x prn, for age appropriate hypotension

BRADYCARDIC AND AGE APPROPRIATE HYPOTENSION PERSISTS AFTER INITIAL DOSE OF EPINEPHRINE

- TRANSCUTANEOUS PACING:
  - Initial rate of **80** beats per minute and increase milliamps until capture is gained
  - Increase the rate as needed until the patient is hemodynamically stable
    - Max total rate 100 beats per minute
    - Max total milliamps 200mA

SEDATION FOR TRANSCUTANEOUS PACING

- **DO NOT** delay transcutaneous pacing to establish IV access
- ETOMIDATE: (preferred sedation medication)
  - 0.1mg/kg IV/IO, over 30 seconds. Max single dose 6mg
  - May repeat 1x prn

OR

- VERSED: (if unable to establish vascular access)
  - 0.2mg/kg IN/IM. Max single dose 5mg
  - May repeat either route 1x prn, in 5 minutes
  - Contraindication - Hypotension
  - Precaution - Monitor for respiratory depression

Cardiogenic Shock

INFORMATION

- Cardiogenic shock can be characterized as the following:
  - A condition in which the heart suddenly can't pump enough blood to meet the body's needs
  - Most often caused by a severe heart attack
  - Rare, but often fatal if not treated immediately

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

HYPOTENSION WITH PULMONARY EDEMA

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain SBP 100 mmHg. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration
- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

WARNING

- **Once SBP is 100 mmHg or greater:**
  - **Refer to the "CHF (Pulmonary Edema)" protocol (p. 74)**
  - **DO NOT administer NITROGLYCERIN for these patients**

PEDIATRIC

AGE APPROPTIATE HYPOTENSION WITH PULMONARY EDEMA

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain age appropriate SBP. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - **DO NOT** administer faster than 1mL/minute
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration
- NORMAL SALINE:
  - 20mL/kg IV/IO, assess lung sounds and BP frequently
  - May repeat 2x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

Chest Pain

INFORMATION

- Assume chest pain to be cardiac in nature until ruled out.

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected
- The right hand and right wrist should be avoided for vascular access if at all possible. These sites may be utilized for cardiac catheterization.
    - The right antecubital vein and anywhere on the left is acceptable
- ASPIRIN:
    - 324mg
    - Contraindications:
        - < 16 years old
        - Active GI bleeding
    - Precaution - Unless the patient has taken 324mg within 24 hours, administer full dose
- FENTANYL:
    - 100mcg IV/IO/IN/IM
    - May repeat 2x prn, in 5 minute intervals
    - Contraindication - Pregnancy near term (32 weeks or greater) or in active labor
    - Precautions:
        - History of opiate abuse or drug seeking behavior
        - Monitor patient for respiratory depression
        - Discontinue if patient becomes drowsy
        - Can be reversed with NARCAN if necessary

PAIN/DISCOMFORT PERSISTS AFTER MAXIMUM FENTANYL ADMINISTRATION OR DRUG SEEKING BEHAVIOR IS SUSPECTED

- NITROGLYCERIN:
    - 0.4mg SL
    - May repeat 2x prn, in 5 minute intervals
    - Contraindications:
        - SBP < 90 mmHg
        - Heart Rate < 50 beats per minute or > 100 beats per minute
        - Erectile Dysfunction Drugs (Viagra and Levitra within 24 hours and Cialis within 48 hours)
        - Right ventricular infarction (positive V4R)
            - Refer to the "STEMI" protocol (pp. 72-73) for right ventricular failure

PEDIATRIC

- Call for orders

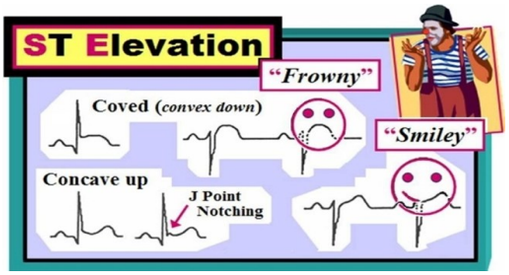
Any patient experiencing chest pain should have serial 15 lead and 12 lead ECGs performed at least every 10 minutes throughout assessment and transport.

INFORMATION

- This protocol may run concurrent with the chest pain protocol as applicable.
- All STEMI Alerts shall be transported as priority 2

STEMI ALERT CRITERIA

- **"SEE IT"**
  - ST-Segment Elevation in 2 or more "Anatomically Contiguous Leads":
    - 12 lead:
      - Convex (frowny face) or straight morphology (any of the following):
        - 2mm or greater in V2 and V3
        - 1mm or greater in all other leads
      - Concave (smiley face) morphology
        - 2mm or greater in any lead
    - 15 lead:
      - 0.5mm or greater in V8 and V9
      - 1mm or greater in V4R alone



  - Anatomically contiguous leads are two or more leads that look at adjoining areas of cardiac tissue
    - If the leads have the same name they are anatomically contiguous leads (e.g., inferior)
    - If the leads are consecutively numbered they are also anatomically contiguous leads (e.g., V4/V5)
      - V6 and V8 are anatomically contiguous leads
  - Use the "PAILS" acronym to help determine which area of the heart is infarcted:
    - P - Posterior: V8, V9
    - A - Anterior: V3, V4
    - I - Inferior: II, III, aVF
    - L - Lateral: I, aVL, V5, V6
    - S - Septal: V1, V2

- **"SAY IT"**
  - When STEMI criteria is met, notify the following:
    - Dispatch
    - Receiving STEMI facility

- **"SEND IT"**
  - Immediately transmit the ECG to the receiving STEMI facility
  - All STEMI ECGs should be transmitted within 10 minutes of patient contact

- **"SET IT"**
  - Apply the QUIK-COMBO pads and set the VF/VT alarm on the cardiac monitor

STEMI ALERT DISQUALIFIERS

- The following are STEMI mimics:
  - Left Bundle Branch Block (QRS complexes > 0.12)
  - Pacemaker with QRS complexes > 0.12
  - Left Ventricular Hypertrophy (LVH)
  - Early repolarization
  - < 2mm of elevation with a concave (smiley face) morphology
- Patient presentations indicative of myocardial ischemia that **DO NOT** meet STEMI Alert Criteria should still be transported Priority 2 to a STEMI facility

ADULT

STEMI ALERT WITH OR WITHOUT CHEST PAIN

- ASPIRIN
  - 324mg
  - Contraindications:
    - < 16 years old
    - Active GI bleeding
  - Precaution - Unless the patient has taken 324mg within 24 hours, administer full dose

RIGHT VENTRICULAR FAILURE: POSITIVE V4R WITH CLEAR LUNG SOUNDS

- NORMAL SALINE:
  - 1L IV/IO. Assess lung sounds and BP frequently.
  - Repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
- If pulmonary edema and hypotension present, refer to the "Cardiogenic Shock" protocol (p. 70)

PBCFR 12/15 Lead EKG STEMI CHART				
I **High Lateral** Reciprocal Changes II, III, aVF	**aVR**	**V1** **Septal** Reciprocal Changes II, III, aVF	**V4** **Anterior** Reciprocal Changes II, III, aVF	**V4R** **Right Side** Reciprocal Changes I, aVL, V leads
II **Inferior** Reciprocal Changes I, aVL, V leads	**aVL** **High Lateral** Reciprocal Changes II, III, aVF	**V2** **Septal** Reciprocal Changes II, III, aVF	**V5** **Low Lateral** Reciprocal Changes II, III, aVF	**V8** **Posterior** Reciprocal Changes V1, V2, V3
III **Inferior** Reciprocal Changes I, aVL, V leads	**aVF** **Inferior** Reciprocal Changes I, aVL, V leads	**V3** **Anterior** Reciprocal Changes II, III, aVF	**V6** **Low Lateral** Reciprocal Changes II, III, aVF	**V9** **Posterior** Reciprocal Changes V1, V2, V3

PEDIATRIC

- Call for orders

Congestive Heart Failure (CHF)

INFORMATION

- Acute Congestive Heart Failure (ACHF) is characterized by the heart's inability to move blood throughout the circulatory system due to dysfunction in heart contractility and filling. When the patient in ACHF presents with systolic hypertension, rapid onset pulmonary congestion, and severe dyspnea, this condition is known as: "Sympathetic Crashing Acute Pulmonary Edema" or "SCAPE". The sudden onset of pulmonary congestion and dyspnea in SCAPE is worsened by increasing systolic hypertension. For these patients, reduction in both preload and afterload is needed, requiring the use of vasodilators such as Nitroglycerin, and thereby reducing the likelihood of intubation.
- **Signs & Symptoms:**
  - Hypertension
  - Tachycardia
  - Dyspnea and/or Orthopnea (shortness of breath while lying flat)
  - Rales
  - Pedal edema
  - May present with wheezing (utilize capnography to differentiate between CHF and exacerbation of COPD/Acute Asthma/Pneumonia)

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

SBP < 160 mmHg

- CPAP 10cmH_2O:
  - Contraindications:
    - SBP < 90 mmHg
    - Without spontaneous respirations
    - With a decreased LOC (lethargic)
    - < 30 kg

WARNING
If patient is febrile or from a nursing home and pneumonia is suspected withhold NITROGLYCERIN.

SBP ≥ 160 mmHg

- NITROGLYCERIN SUBLINGUAL:
  - 0.8mg SL (2 tablets)
  - Contraindications:
    - SBP < 90 mmHg
    - Heart Rate < 50 beats per minute
    - Erectile Dysfunction Drugs (Viagra and Levitra within 24 hours and Cialis within 48 hours).
    - Right ventricular infarction (positive V4R).
      - Refer to the "STEMI" protocol (pp. 72-73) for right ventricular failure
- CPAP 10cmH_2O: as noted above

SBP REMAINS ≥ 160 mmHg (AFTER SUBLINGUAL NITROGLYCERIN)

- NITROGLYCERIN INFUSION:
  - **Dilute**: 600mcg (6 mL) of NITROGLYCERIN in a 50mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
      - Titrate to maintain SBP < 160 mmHg
      - Reassess BP immediately
    - Repeat 1x if SBP remains ≥ 160 mmHg
    - Contraindications: as noted above

PEDIATRIC

- Call for orders

Supraventricular Tachycardia

INFORMATION

- Use the following criteria to assist in determination of Sinus Tachycardia vs SVT:
  - SVT is a regular and narrow QRS complex that will generally have no discernible P-waves.
  - History that favors Sinus Tachycardia (e.g., dehydration, fever, pain, anxiety, physical activity, exertional heat stroke, etc.)
  - For Adults **ONLY**, the following formula can be useful when differentiating between Sinus Tachycardia vs SVT:
    - 220 - patient's age = maximum threshold for Sinus Tachycardia

Adult:

- QRS width **< 0.12 (3 small boxes)**
- Rate > 150 beats per minute after Sinus Tachycardia has been ruled out

Pediatric:

- QRS width **< 0.08 (2 small boxes)**
- SVT in pediatrics is considered > 180 beats per minute
- SVT in infants is considered > 220 beats per minute

ADULT

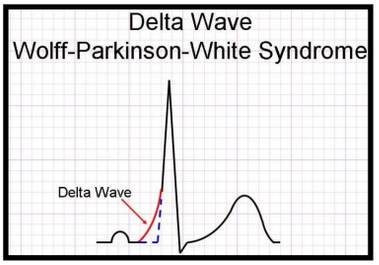
- Obtain 15 lead and 12 lead ECGs and leave cables connected

STABLE (AAOX4 WITH OR WITHOUT HYPOTENSION)

- MODIFIED VAGAL MANEUVERS
  - While in an upright seated position, have the patient blow into a syringe for 15 seconds
  - After 15 seconds, lay the patient supine and raise both legs 45 degrees
- ADENOSINE:
  - 12mg rapid IV/IO, with a simultaneous 20mL NORMAL SALINE flush
  - Print ECG during administration
  - Contraindications:
    - Heart Transplant
    - Patient taking Tegretol (Carbamazepine)
    - History of 2nd or 3rd degree heart blocks (except in patients with a functioning artificial pacemaker)
    - Sick Sinus Syndrome without cardiac pacemaker in place
    - Active bronchospasm

SVT FAILS TO CONVERT OR ADENOSINE IS CONTRAINDICATED OR PATIENT HAS HISTORY OF ATRIAL DYSRHYTHMIAS

- CARDIZEM INFUSION:
  - **Dilute:** 10mg of CARDIZEM in a 50 mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
  - If no response in 5 minutes, repeat dilution and administration above with 15mg IV/IO
  - Contraindications:
    - Hypotension
    - QRS width > 0.12 (3 small boxes)
    - History of WPW
    - Sick sinus syndrome
    - Heart Blocks
  - Precautions:
    - Use with caution for patients taking beta blockers
    - May cause hypotension, see treatment on following page



CARDIZEM INDUCED HYPOTENSION

- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
- CALCIUM CHLORIDE:
  - 500mg IV/IO, over 2 minutes

UNSTABLE (ALTERED MENTAL STATUS WITH OR WITHOUT HYPOTENSION)

- **DO NOT** delay cardioversion to establish IV access
- ETOMIDATE (consider for sedation):
  - 6mg IV/IO, administer over 30 seconds
  - May repeat 1x prn
- SYNCHRONIZED CARDIOVERSION:
  - 100j, 200j, 300j, 360j
  - Repeat 360j until successfully converted
  - Contraindication - A-Fib or A-Flutter
  - Precaution - A brief trial of ADENOSINE can be used prior to cardioversion for a diagnostic tool if you suspect the underlying rhythm to be A-Fib or A-Flutter

PEDIATRIC

- Obtain 15 lead and 12 lead ECGs and leave cables connected

STABLE (AAOX4 WITH OR WITHOUT AGE APPROPRIATE HYPOTENSION)

- MODIFIED VAGAL MANEUVERS
  - While in an upright seated position, have the patient blow into a syringe for 15 seconds
  - After 15 seconds, lay the patient supine and raise both legs 45 degrees
- ADENOSINE:
  - 0.2mg/kg rapid IV/IO, with a simultaneous 10mL NORMAL SALINE flush. Max single dose 12mg
  - If no change in 1 minute:
    - 0.2mg/kg rapid IV/IO, with a simultaneous 10mL NORMAL SALINE flush. Max single dose 12mg
  - Print ECG during administration
  - Contraindications - Refer to Adult ADENOSINE contraindications

UNSTABLE (ALTERED MENTAL STATUS WITH OR WITHOUT AGE APPROPRIATE HYPOTENSION)

- ETOMIDATE (consider for sedation):
  - 0.1mg/kg IV/IO, over 30 seconds. Max single dose 6mg
  - May repeat 1x prn. Max total dose 12mg
- SYNCHRONIZED CARDIOVERSION:
  - 0.5j/kg
  - If not effective, increase to 2j/kg
  - Repeat 2j/kg until successfully converted
  - Contraindication - A-Fib or A-Flutter

Wide Complex Tachycardia (WCT)

INFORMATION

- ECG features that favor a diagnosis of Ventricular Tachycardia (V-Tach):
  - V-Tach has no discernible P waves
  - Precordial concordance: All chest leads point in the same direction (either positive OR negative)
  - Negative Lead V6
  - Backward frontal plane axis: II, III, and aVF are negative, aVL and aVR are positive
  - Presence of capture beats or fusion beats (sinus beats that interrupt the WCT)
  - Consistent rate usually > 120 beats per minute
  - QRS width > **0.12 (3 small boxes)**

ADULT & PEDIATRIC

IF SVT WITH ABERRANCY IS SUSPECTED

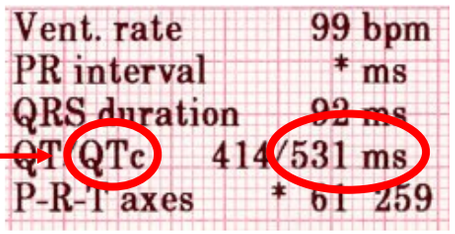
- **Consider attempting VAGAL MANEUVER first**
- **A single dose of ADENOSINE may also be administered**
  - **Refer to "Supraventricular Tachycardia" (pp. 75-76)**
- **If there is no change in ECG, treat as WCT**
- **If any AMIODARONE contraindication is present, treat as UNSTABLE**

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

STABLE WIDE COMPLEX TACHYCARDIA (WCT)

- AMIODARONE INFUSION:
  - **Dilute**: 150mg of AMIODARONE in a 50mL bag of NORMAL SALINE
    - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)
    - Administer all 150mg, even if the WCT terminates
    - May repeat 1x prn
  - Contraindications:
    - Marked sinus bradycardia
    - QRS width ≥ 0.20 (one large box)
    - Cardiogenic Shock
    - QTc > 500
    - 2nd or 3rd Degree Heart Blocks
    - Hypotension



  - Precaution - Monitor for widening QRS during infusion by performing serial 12-lead ECGs
    - Refer to the "Really Wide Complex Tachycardia" protocol (pp. 79-80) for widening QRS

UNSTABLE WCT (ANY AMIODARONE CONTRAINDICATION)

- **DO NOT** delay cardioversion to establish IV access
- ETOMIDATE (consider for sedation):
  - 6mg IV/IO, administer over 30 seconds
  - May repeat 1x prn
- SYNCHRONIZED CARDIOVERSION:
  - 100j, 200j, 300j, 360j
  - Repeat 360j until successfully converted
    - If a WCT converts with cardioversion and later returns to a WCT, use the last successful energy setting and increase as needed
  - Contraindication - WCTs that are **irregularly - irregular**

WCT PATIENTS WHO CONVERT AFTER CARDIOVERSION

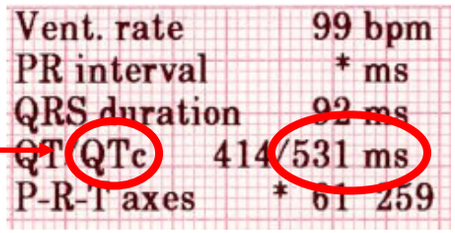
- Immediate 12 lead to rule out any contraindications to AMIODARONE
- AMIODARONE INFUSION: as noted on the previous page (if not already administered)
  - **ONLY** for patients who convert after any of the following:
    - 2 cardioversions by Fire Rescue
    - 2 or more shocks by their Implantable Cardioverter-Defibrillator (ICD) or an AED
  - **DO NOT** administer AMIODARONE if the patient has already received AMIODARONE

PEDIATRIC

- Pediatrics that have a QRS width **> 0.08 (2 small boxes)**
- Obtain 15 lead and 12 lead ECGs and leave cables connected

STABLE WIDE COMPLEX TACHYCARDIA

- AMIODARONE INFUSION:
  - **Dilute**: 5mg/kg of AMIODARONE in a 50mL bag of NORMAL SALINE. Max single dose 150mg
    - Administer over 25 minutes IV/IO by utilizing a 15 gtt set delivering 30 gtts/min (1 gtts/2 sec)
  - May repeat 1x prn
- Contraindications:
  - Marked sinus bradycardia
  - QRS width ≥ 0.16 (4 small boxes)
  - Cardiogenic Shock
  - QTc > 500
  - 2nd or 3rd Degree Heart Blocks
  - Age appropriate hypotension



  - Precaution - Monitor for widening QRS during infusion by performing serial 12-lead ECGs
    - Refer to the "Really Wide Complex Tachycardia" protocol (pp. 79-80) for widening QRS

UNSTABLE WCT (ANY AMIODARONE CONTRAINDICATION)

- **DO NOT** delay cardioversion to establish IV access
- ETOMIDATE:
  - 0.1mg/kg IV/IO, over 30 seconds. Max single dose 6mg
  - May repeat 1x prn
- SYNCHRONIZED CARDIOVERSION:
  - 0.5j/kg
  - If no response, increase to 2j/kg
  - Repeat 2j/kg until successfully converted
    - If a WCT converts with cardioversion and later returns to a WCT, use the last successful energy setting and increase as needed
  - Contraindication - WCTs that are **irregularly-irregular**

PATIENT WHO CONVERTS AFTER CARDIOVERSION

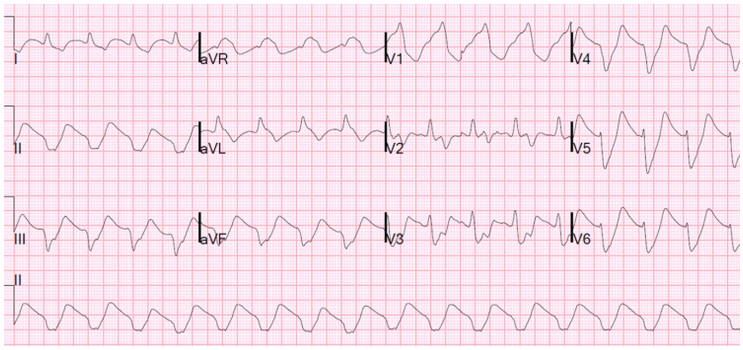
- Immediate 12 lead to rule out any contraindications to AMIODARONE
- AMIODARONE INFUSION: as noted above (if not already administered)
  - **ONLY** for patients who convert after any of the following:
    - 2 cardioversions by Fire Rescue
    - 2 or more shocks by their Implantable Cardioverter Defibrillator (ICD) or an AED
  - **DO NOT** administer AMIODARONE if the patient has already received AMIODARONE

Really Wide Complex Tachycardia (RWCT)

INFORMATION

- ECG features that favor a diagnosis of Really Wide Complex Tachycardia (RWCT):
  - RWCT in adult patients has a QRS width **≥ 0.20 (5 small boxes or 1 large box).**
  - Pediatric patients have a QRS width **≥ 0.16 (4 small boxes).**
  - Rate usually < 120 beats per minute
    - Instances of severe metabolic imbalance may present with a faster rate that can be inconsistent
  - Widening and bizarre QRS complex

RWCT



ADULT

- CALCIUM CHLORIDE:
  - 1g IV/IO, over 2 minutes
  - Precaution - **DO NOT** administer in same IV/IO line as SODIUM BICARBONATE without thoroughly flushing
- SODIUM BICARBONATE:
  - 100mEq IV/IO, over 2 minutes
  - Precaution - **DO NOT** administer in same IV /IO line as CALCIUM CHLORIDE without thoroughly flushing

RWCT NOT RESPONDING TO ABOVE TREATMENT

- ETOMIDATE (consider for sedation):
  - 6mg IV/IO, administer over 30 seconds
  - May repeat 1x prn
- SYNCHRONIZED CARDIOVERSION:
  - 100j, 200j, 300j, 360j
    - If a RWCT converts with cardioversion and later returns to a WCT, use the last successful energy setting and increase as needed
  - Contraindication - WCTs that are **irregularly irregular**

RWCT FAILS TO CONVERT AFTER CARDIOVERSION OF 360J

- SYNCHRONIZED CARDIOVERSION:
  - 360j every 2 minutes prn

PEDIATRIC

- CALCIUM CHLORIDE:
  - 20mg/kg IV/IO, over 2 minutes
  - Precaution - **DO NOT** administer in same IV/IO line as SODIUM BICARBONATE without thoroughly flushing
- SODIUM BICARBONATE:
  - 1mEq/kg IV/IO, over 2 minutes. Max single dose 50mEq
  - May repeat 1x prn, in 5 minutes. Max total dose 100mEq
  - Precaution - **DO NOT** administer in same IV/IO line as CALCIUM CHLORIDE without thoroughly flushing

RWCT NOT RESPONDING TO ABOVE TREATMENT

- ETOMIDATE (consider for sedation):
  - 0.1mg/kg IV/IO, over 30 seconds. Max single dose 6mg
  - May repeat 1x prn
- SYNCHRONIZED CARDIOVERSION:
  - 0.5j/kg
  - If no response, increase to 2j/kg
    - If a WCT converts with cardioversion and later returns to a WCT, use the last successful energy setting and increase as needed
  - Contraindication - WCTs that are **irregularly irregular**

RWCT FAILS TO CONVERT AFTER CARDIOVERSION

- SYNCHRONIZED CARDIOVERSION:
  - 2j/kg every 2 minutes prn

Polymorphic V-Tach/ Torsades de Pointes

INFORMATION

- Torsades de Pointes is an uncommon form of Polymorphic V-Tach characterized by a changing in amplitude or "twisting" of the QRS complexes.
- Risk factors for Torsades:
  - Congenital long QT syndrome
  - Female gender
  - Renal/Liver failure
  - Medications that cause QT interval prolongation (e.g., anti-dysrhythmics, calcium channel blockers, psychiatric drugs, antihistamines)

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

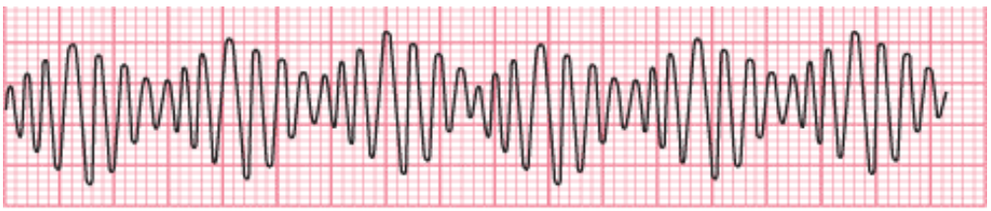
STABLE POLYMORPHIC V-TACH

- MAGNESIUM SULFATE INFUSION:
  - **Dilute**: 2g of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension

UNSTABLE POLYMORPHIC V-TACH (HYPOTENSION)

- MAGNESIUM SULFATE INFUSION:
  - **Dilute**: 2g of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension
- ETOMIDATE (consider for sedation):
  - 6mg IV/IO, administer over 30 seconds
  - May repeat 1x prn
- DEFIBRILLATION:
  - 360j
  - Repeat 360j prn until successfully converted

Torsades



Polymorphic V-Tach/Torsades de Pointes

PEDIATRIC

- Obtain 15 lead and 12 lead ECGs and leave cables connected

STABLE POLYMORPHIC V-TACH

- MAGNESIUM SULFATE INFUSION:
  - **Dilute**: 40mg/kg of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
    - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75gtts/min (1.25gtts/sec)
  - Max dose 2g
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension

UNSTABLE POLYMORPHIC V-TACH (AGE APPROPRIATE HYPOTENSION)

- MAGNESIUM SULFATE INFUSION:
  - **Dilute**: 40mg/kg of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
    - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75gtts/min (1.25gtts/sec)
  - Max dose 2g
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension
- ETOMIDATE (consider for sedation):
  - 0.1mg/kg IV/IO, over 30 seconds. Max single dose 6mg
  - May repeat 1x prn
- DEFIBRILLATION:
  - 1st defibrillation - 4j/kg
  - 2nd defibrillation - 4j/kg
  - 3rd defibrillation - 4j/kg
  - Increase to 10j/kg if unable to convert Torsades after 3rd defibrillation
    - Repeat every 2 minutes, prn
  - If Torsades converts with defibrillation and later returns to Torsades, use the last successful energy setting and increase as needed

Left Ventricular Assist Device (LVAD)

INFORMATION

- Left Ventricular Assist Devices (LVADs), also known as Heart Pumps, are surgically implanted circulatory support devices designed to assist the pumping action of the heart.

ADULT

- Every effort should be made to contact the patient's primary caretaker (spouse, guardian, etc.) and the LVAD coordinator immediately
  - The phone number for the LVAD coordinator will be on the device and the equipment carrying bag
  - If needed, assist patient or caretaker with replacing the device's batteries or cables.
- Locate patient's emergency "bag" with backup equipment
- Take all equipment associated with the LVAD system to the ED
- Treat non-LVAD associated conditions in accordance with the appropriate protocol
- AUSCULTATE:
  - Determine the type of device, assess alarms, and auscultate for pump sounds
  - Patients with a properly functioning LVAD may not have a detectable pulse, measurable blood pressure, or accurate oxygen saturation
  - Auscultate chest and upper abdominal quadrants
    - Continuous humming sound = pump is working
- Locate the driveline site on the patient's abdomen
  - **DO NOT** cause any trauma to the driveline site or wires
  - If there is bleeding at the driveline site, apply direct pressure

HYPOPERFUSION

- NORMAL SALINE:
  - 500mL IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

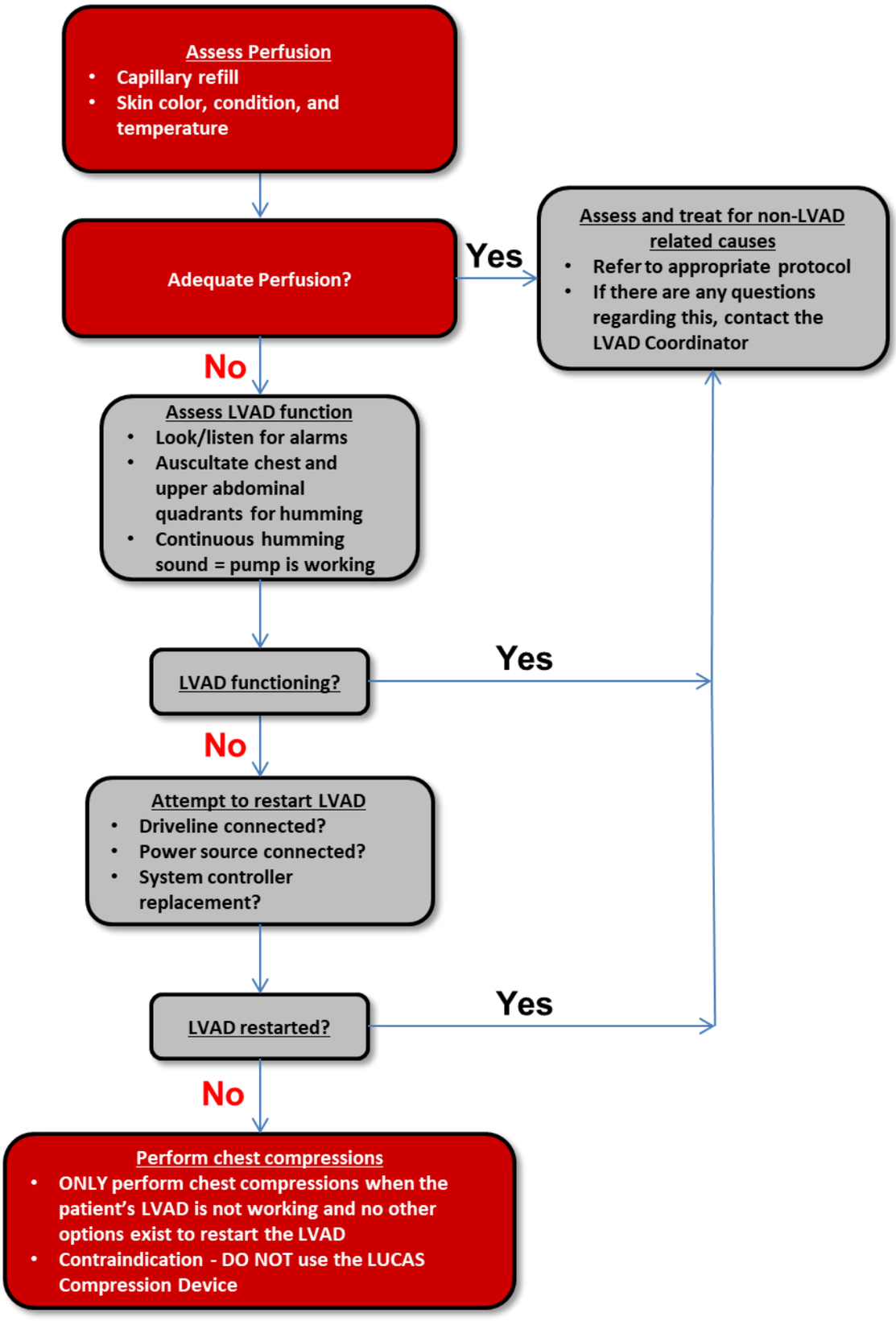
TRANSPORT

- Non-LVAD chief complaints should be transported according to the "Transport Destinations" protocol (pp. 19-20)
  - If there are any questions regarding this, contact the EMS Captain and LVAD Coordinator
- JFK MEDICAL CENTER LVAD COORDINATOR:
  - (561) 548-5823
  - Any LVAD issue should be transported to JFK Medical Center

WARNING

Be aware of the cables, controller, and batteries when preparing for transport. It may be best to place the stretcher straps under the LVAD cables so you are not creating any torque on the device.

UNRESPONSIVE PATIENT



CARDIAC ARREST

Standing Orders (pp. 87-88)

Adult Cardiac Arrest (p. 89)

Adult Post Resuscitation (pp. 90-91)

Pediatric Cardiac Arrest (p. 92)

Pediatric Post Resuscitation (pp. 93-94)

Special Considerations (pp. 95-97)

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INFORMATION

- There is no scientific basis in trying to resuscitate an unwitnessed, asystolic patient who has succumbed to the dying process of a terminal illness. Consideration should be given to not starting resuscitation efforts in these cases.
- **ALL** witnessed cardiac arrest patients must be transported.
  - **Exception**: Hospice/DNR patients
- In general, when the scene is safe, all cardiac arrests should be worked on scene.
- Perform all assignments in "Pit Crew" fashion and make all efforts to obtain a Return Of Spontaneous Circulation (ROSC) prior to leaving the scene.

ADULT & PEDIATRIC

DETERMINATION OF DEATH

- The paramedic may determine that the patient is dead/non-salvageable and decide not to resuscitate if:
  - **At least 1** of the following conditions is present:
    - Lividity
    - Rigor mortis
    - Tissue decomposition
    - A valid DNRO is presented or discovered

    OR
  - If **ALL** of the following are present:
    - Known down time > 30 minutes
    - Asystole
    - Pupils fixed and dilated
    - Apneic
    - Without hypothermic mechanism for arrest

AIRWAY

- AIRWAY POSITIONING:
  - Refer to "Basic Life Support" (p. 16)
- The preferred airway of choice in cardiac arrest is a Supraglottic Airway (SGA)
  - Intubation should **ONLY** be performed if you are unable to successfully manage the patient's airway with the SGA

BREATHING

- PATIENT WITHOUT A PULSE:
  - Refer to "Ventilatory Assistance" (p. 17)

CIRCULATION

- Perform manual chest compressions at a rate of 110/minute.
  - Utilize the metronome on the "Handtevy" app
- Emphasis is placed on minimizing interruptions in compressions to no more than 5 seconds.
- Apply the LUCAS Compression Device **AFTER** the initial rhythm check with minimal interruptions to chest compressions, then utilize the "continuous compressions" setting.
- Pause the compressions to assess for a shockable rhythm every 2 minutes/220 compressions.
- **DO NOT** stop the LUCAS Compression Device for defibrillations or advanced airway procedures.
- Elevate the patient's head 15° after the SGA and the ResQPOD are applied.
  - Maintain head elevation during the Post Resuscitation protocol

ADULT & PEDIATRIC (continued)

MEDICATIONS

- Medications should be delivered as soon as possible after the rhythm check (during compressions) and circulated for 2 minutes
- Follow all IV/IO medication administrations with:
  - NORMAL SALINE:
    - 10mL flush
- Search for possible causes and treat accordingly (e.g., H's & T's, etc.)

RESQPOD

- ResQPOD should be used for all cardiac arrest patients
  - Contraindications:
    - < 1 year old
    - Traumatic arrest
    - Pulse present

TERMINATION OF EFFORTS

- Consider terminating efforts when an EMS Captain is on scene and:
  - "Persistent Asystole" for 15 minutes and confirmed by ultrasound
  - $EtCO_2$ of < 15 mmHg
  - Patient is normothermic
  - DEFIBRILLATION (Performed early in the resuscitation)
    - Adult:
      - 360j
    - Pediatric:
      - 4j/kg
  - NORMAL SALINE:
    - Adult:
      - 500mL
    - Pediatric:
      - Refer to "Handtevy" System for dose
  - All reversible causes have been addressed
  - All ALS interventions have been completed
  - Social support group is in place for the family if needed.

H's

Hydrogen Ion (Acidosis):	***Ventilation***
Hyperkalemia (Renal Failure):	***Calcium Chloride, Sodium Bicarb, Albuterol***
Hypoglycemia:	***Glucose***
Hypoxia:	***Oxygen & Ventilate***
Hypovolemia:	***Fluid Bolus***
Hypothermia:	***Warming***

T's

•Toxins or Tablets (OD):	***Opiates (Narcan)***
	Tricyclic Antidepressants (Sodium Bicarb)
	Calcium Channel Blocker (Calcium Chloride)
•Tension Pneumothorax:	***Bilateral Pleural Decompression or Finger Thoracostomy***

Adult Cardiac Arrest

WARNING
INTUBATION
Intubation should ONLY be performed if you are unable to successfully manage the patient's airway with the SGA.

Once working an arrest, no further pulse checks shall be performed until a spike in $EtCO_2$ or signs of life present.

ESTABLISH RESPONSIVENESS
No respirations/gasping

CHECK PULSE

NO PULSE
Begin 220 Compressions (110 per minute)

DURING COMPRESSIONS
- Turn on Handtevy app metronome
- Apply defibrillator pads
- Continue compressions during defibrillator charge.
- Shock or 'Dump'
- Charge defibrillator when chest compressor announces "200" or every 1 minute 45 seconds
- Assess rhythm and defibrillate as needed.

AIRWAY
Deliver 2 full ventilations with BVM

PATENT | **FBAO**

Attempt to remove FBAO with laryngoscope and Magill forceps. If obstruction cannot be removed, perform a surgical cricothyrotomy

Insert an SGA

- Apply $EtCO_2$ filter line
- Apply ResQPOD if not contraindicated
- Ventilate 1 breath approximately every 10 seconds
- Deliver 1 additional ventilation during every rhythm check
- Utilize the metronome on Handtevy app to synchronize ventilations

Continue cycles of:
220 compressions, rhythm check, defibrillation prn, medication administration, repeat sequence. Consider H's & T's.

ASYSTOLE/PEA DRUG THERAPY
- EPI (1:10,000)
  - 1mg IV/IO
  - Repeat every 5 minutes prn. Max total dose 3mg.
- NORMAL SALINE
  - Max 2L

V-FIB/V-TACH ELECTRICAL/DRUG THERAPY
- DEFIBRILLATE
  - 360j every 2 minutes, prn
- AMIODARONE
  - 1st Dose – 300mg IV/IO
  - In 5 minutes if indicated 2nd Dose – 150mg IV/IO

TORSADES ELECTRICAL/DRUG THERAPY
- DEFIBRILLATE
  - 360j every 2 minutes, prn
- MAGNESIUM SULFATE
  - 2g IV/IO

Adult Post Resuscitation

Remove ResQPOD from the SGA or ETT

Ventilate
- 1 ventilation approximately every 6 seconds
- Provide each ventilation over 1 second
- Manometer pressure: 15-20 cmH_2O

WARNING
DO NOT attempt to aggressively normalize capnometry/$EtCO_2$ in cardiac arrest pre/post ROSC.

Obtain 15 and 12 lead ECGs and leave cables connected

Heart Rate:
- Reference specific protocol

Rhythm:
- Reference specific protocol

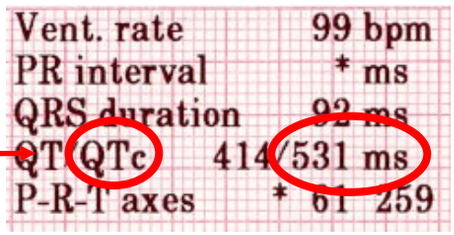
Blood Pressure:
(Goal is to maintain SBP of 100 mmHg)
- NORMAL SALINE
- 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently
- May repeat 1x, prn
- Precautions – Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

If Patient Remains Hypotensive:
- PUSH-DOSE EPINEPHRINE
- Dilute: Refer to "Medication Dilution Instructions" (p. 12)
  - Administer 1mL/minute IV/IO
  - Titrate to maintain SBP 100 mmHg. Max total dose 300mcg (30mL)
- Contraindications: Hypotension secondary to blood loss
- Precautions:
  - Rapid (1 minute onset), short (5-10 minute) duration
  - Monitor heart rate and blood pressure throughout administration

If Patient Remains Unresponsive:
- Apply ICE PACKS to the axilla and groin
- Contraindication - Trauma

POST V-FIB/V-TACH CONSIDERATIONS IF NO AMIODARONE WAS ADMINISTERED AND 2 SHOCKS HAVE BEEN DELIVERED

- AMIODARONE INFUSION:
  - **Dilute**: 150mg of AMIODARONE in a 50mL bag of NORMAL SALINE
    - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)
    - Administer all 150mg, even if the WCT terminates
    - May repeat 1x prn
  - Contraindications:
    - Marked Sinus Bradycardia
    - QRS width > 0.20 (one large box)
    - Cardiogenic Shock
    - QTc > 500
    - 2nd or 3rd Degree Heart Blocks
    - Hypotension



  - Precaution - Monitor for widening QRS during infusion by performing serial 12-lead ECGs
    - Refer to the "Really Wide Complex Tachycardia" protocol (pp. 79-80) for widening QRS

POST TORSADES AND MAGNESIUM SULFATE HAS NOT BEEN ADMINISTERED

- **Dilute**: 2g of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
  - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)
- Contraindication - 2nd or 3rd Degree Heart Blocks
- Precaution - Rapid infusion may cause hypotension

Patients who have just regained a pulse after a period of cardiac arrest, are prone to "Post ROSC Arrhythmias". These arrhythmias are generally self-limiting and may resolve without further intervention. If the patient has regained ROSC and is perfusing sufficiently, monitor the ECG. If the patient cannot maintain ROSC, treat the arrhythmia per the specific protocol.

Pediatric Cardiac Arrest

ESTABLISH RESPONSIVENESS
No respirations/gasping

WARNING
INTUBATION
Intubation should ONLY be performed if you are unable to successfully manage the patient's airway with an SGA.

CHECK PULSE

NO PULSE
Begin 220 Compressions (110 per minute)

DURING COMPRESSIONS
- Turn on Handtevy app metronome
- Apply defibrillator pads
- Continue compressions during defibrillator charge.
- Shock or 'Dump'
- Charge defibrillator when chest compressor announces "200" or every 1 minute 45 seconds
- Assess rhythm and defibrillate as needed.

Once working an arrest, no further pulse checks shall be performed until a spike in $EtCO_2$ or signs of life present.

AIRWAY
Deliver 2 full ventilations with BVM

PATENT | **FBAO**

Attempt to remove FBAO with laryngoscope and Magill forceps. If obstruction cannot be removed, perform a needle cricothyrotomy

Insert an SGA

- Apply $EtCO_2$ filter line
- Apply ResQpod if not contraindicated
- Ventilate at a rate of 1 ventilation approximately every 10 seconds
  - 1 ventilation every 3 seconds during a neonatal resuscitation
- Deliver 1 additional ventilation during every rhythm check
- Utilize the metronome on Handtevy app to synchronize ventilations

Continue cycles of:
220 compressions, rhythm check, defibrillation prn, medication administration, repeat sequence. Consider H's & T's.

ASYSTOLE/ PEA DRUG THERAPY
- EPI (1:10,000)
  - 0.01mg/kg IV/IO
  - May repeat 2x prn every 5 minutes
- NORMAL SALINE
  - 20mL/kg IV/IO
  - May repeat 2x prn

V-FIB/V-TACH ELECTRICAL/DRUG THERAPY
- DEFIBRILLATE EVERY 2 MINS, PRN
  - 1st defibrillation – 4j/kg
  - 2nd defibrillation – 4j/kg
  - 3rd defibrillation – 4j/kg
  - Increase to 10j/kg if unable to convert V-FIB/V-TACH/TORSADES after 3rd defibrillation
    - Repeat every 2 minutes prn
- AMIODARONE
  - 5mg/kg every 5 minutes. Max single dose 300mg.
  - May repeat 2x, prn. Max total dose 450mg

TORSADES ELECTRICAL/DRUG THERAPY
- DEFIBRILLATE
  - As noted above
- MAGNESIUM SULFATE
  - 40mg/kg IV/IO

Pediatric Post Resuscitation

Remove ResQPOD from the SGA or ETT

Ventilate
- 1 ventilation approximately every 3 seconds
- Provide each ventilation over 1 second
- Manometer pressure: 15-20 cmH_2O

WARNING
DO NOT attempt to aggressively normalize capnometry/$EtCO_2$ in cardiac arrest pre/post ROSC.

Obtain 15 and 12 lead ECGs and leave cables connected

Heart Rate:
- Reference specific protocol

Rhythm:
- Reference specific protocol

Blood Pressure:
(Refer to the "Handtevy" system)
- NORMAL SALINE
- 20mL/kg IV/IO. Assess lung sounds and BP frequently
- May repeat 2x prn, for age appropriate hypotension

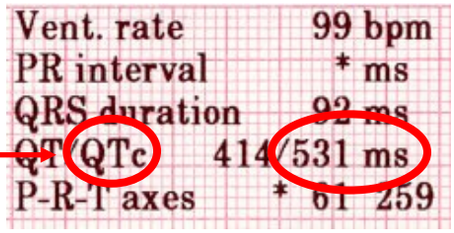
If Patient Remains Hypotensive:
- PUSH-DOSE EPINEPHRINE
- Dilute: Refer to "Medication Dilution Instructions" (p. 12)
  - Administer 1mL/minute IV/IO
  - Titrate to maintain age appropriate SBP. Max total dose 300mcg (30mL)
- Contraindications: Hypotension secondary to blood loss
- Precautions:
  - DO NOT administer faster than 1mL/minute
  - Push-dose Pressor Epinephrine has a rapid (1 minute) onset, short (5-10 minute) duration
  - Monitor heart rate and blood pressure throughout administration

If Patient Remains Unresponsive:
- Apply ICE PACKS to the axilla and groin
- Contraindication - Trauma

PEDIATRIC

POST V-FIB/V-TACH CONSIDERATIONS IF NO AMIODARONE WAS ADMINISTERED AND 2 SHOCKS HAVE BEEN DELIVERED

- AMIODARONE INFUSION:
  - **Dilute**: 5mg/kg of AMIODARONE in a 50mL bag of NORMAL SALINE. Max single dose 150mg
    - Administer over 25 minutes IV/IO by utilizing a 15gtt set delivering 30 gtts/min (1gtts/2sec)
  - May repeat 1x prn
  - Contraindications:
    - Marked sinus bradycardia
    - QRS width > 0.16 (4 small boxes)
    - Cardiogenic Shock
    - QTc > 500
    - 2nd or 3rd Degree Heart Blocks
    - Age appropriate hypotension



  - Precaution - Monitor for widening QRS during infusion by performing serial 12-lead ECGs
    - Refer to the "Really Wide Complex Tachycardia" protocol (pp. 79-80) for widening QRS

POST TORSADES AND MAGNESIUM SULFATE HAS NOT BEEN ADMINISTERED

- MAGNESIUM SULFATE INFUSION:
  - **Dilute**: 40mg/kg of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
    - Administer over 25 minutes IV/IO by utilizing a 15 gtt set delivering 30gtts/min (1gtts/2sec)
  - Max dose 2g
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension

Patients who have just regained a pulse, after a period of cardiac arrest, are prone to "Post ROSC Arrhythmias". These arrhythmias are generally self-limiting and may resolve without further intervention. If the patient has regained ROSC and is perfusing sufficiently, monitor the ECG. If the patient cannot maintain ROSC, treat the arrhythmia per the specific protocol.

INFORMATION

- The below treatments are in addition to standard therapy.

ADULT

CPR INDUCED CONSCIOUSNESS

- Defined as a patient without a spontaneous heartbeat who regains consciousness while receiving CPR
- KETAMINE INFUSION:
  - **Dilute**: 200mg of KETAMINE in a 50mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
  - May repeat 1x prn
  - Contraindications:
    - Pregnant
    - Penetrating eye injury
    - Non-traumatic chest pain

HYPOGLYCEMIA

- D10:
  - 250mL
    - Administer IV/IO utilizing a 15 gtt set, run wide open
  - Retest glucose
  - May repeat 1x prn

REFRACTORY V-FIB/V-TACH

- Defined as persistent V-Fib/V-Tach with no transient interruption of V-Fib/V-Tach after 3 defibrillations
- If **ALL 3** of the below treatments have failed to convert the refractory V-Fib/V-Tach:
  - 3 or more standard defibrillations have been delivered
  - Correctable causes (e.g., H's & T's) have been addressed
  - 450mg of AMIODARONE has been administered
- DOUBLE SEQUENTIAL DEFIBRILLATION:
  - Apply an additional set of external defibrillations pads anterior/lateral **OR** anterior/posterior depending on where the initial pads were placed
  - Verify both monitors/defibrillators are attached and confirm V-Fib/V-Tach rhythm on both monitors
  - Charge both monitors to the maximum energy setting and ensure all team members are clear of the patient
  - Defibrillate by pressing both shock buttons sequentially
  - Repeat every 2 minutes until termination of Refractory V-Fib/V-Tach
- ESMOLOL:
  - 40mg IV/IO, over 1 minute
- ESMOLOL INFUSION (If refractory V-Fib/V-Tach is still present):
  - **Dilute**: 60mg of ESMOLOL in a 50mL bag of NORMAL SALINE
  - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)

ADULT

HYPERKALEMIA

- CALCIUM CHLORIDE:
  - 1g IV/IO
  - Precaution - **DO NOT** administer in same IV/IO line as SODIUM BICARBONATE without thoroughly flushing
- ALBUTEROL:
  - 2.5mg via nebulizer
    - Continuous treatments (if an advanced airway is utilized, administer via in-line nebulization)
- SODIUM BICARBONATE:
  - 100mEq IV/IO
  - Precaution - **DO NOT** administer in same IV/IO line as CALCIUM CHLORIDE without thoroughly flushing

EXCITED DELIRIUM

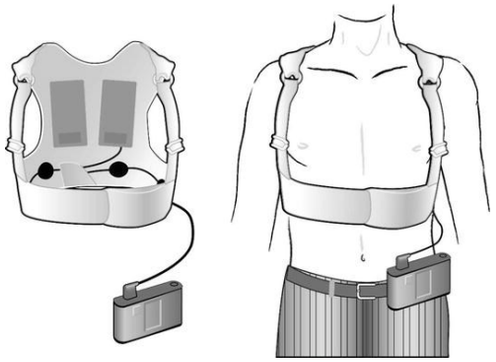
- SODIUM BICARBONATE:
  - 100mEq IV/IO
- COLD NORMAL SALINE (if available):
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

THIRD TRIMESTER

- Manually displace the uterus to the left →
- Transport to the closest OB hospital
  - **Exception**: Trauma alerts

WEARABLE CARDIOVERTER DEFIBRILLATOR (WCD)

- Worn directly against the patient's skin by patients who are at risk of sudden cardiac arrest.
- Sometimes referred to as a "Life Vest"
- This device will not circulate blood, its sole purpose is to provide an AED function in the event of a sudden cardiac arrhythmia.
- If a patient with a WCD presents in cardiac arrest
  - Begin chest compressions immediately
  - Remove the WCD and provide manual DEFIBRILLATIONS as needed
  - Bring the WCD Monitor to the hospital with the patient



ADULT & PEDIATRIC

PULSELESS ELECTRICAL ACTIVITY (PEA) IN CARDIAC ARREST

- Defined as an organized rhythm ≥ 20 beats per minute. Anything less is considered asystole and should be treated as such
- Ultrasound should be utilized to assess for cardiac motion in PEA ≥ 20 beats per minute
    - Organized rhythm **WITH** cardiac motion present:
        - Refer to "Post Resuscitation" protocol (pp. 90-91 & pp.93-94)
    - Organized rhythm **WITHOUT** cardiac motion present:
        - Continue resuscitation efforts

ELECTROCUTION (ALTERNATING CURRENT)

- Immediate DEFIBRILLATION, as applicable
- Consider Spinal Motion Restriction
- Transport patient as a Trauma Alert

LIGHTNING STRIKE (DIRECT CURRENT)

- Immediate DEFIBRILLATION, as applicable
- Consider Spinal Motion Restriction
- Transport patient as a Trauma Alert

COMMOTIO CORDIS

- Sudden arrhythmia caused by something striking the chest directly over the heart. Most commonly occurs in sport related activities.
- Immediate DEFIBRILLATION, as applicable
- Transport to closest ED

CYANIDE EXPOSURE

- Any firefighter who suffers cardiac arrest during or within 6 hours after a fire incident, shall be treated for a Cyanide Exposure
- Refer to the "Cyanide Exposure" protocol (p. 123), for Cyanokit dosing

HANGING

- Consider Spinal Motion Restriction
- Transport to closest ED

DROWNING

- No drowning victim is to be pronounced dead at the scene if the possibility of hypothermia exists
- Deliver 5 full ventilations via BVM initially
- Remove patient's wet clothes
- Dry and cover with blankets

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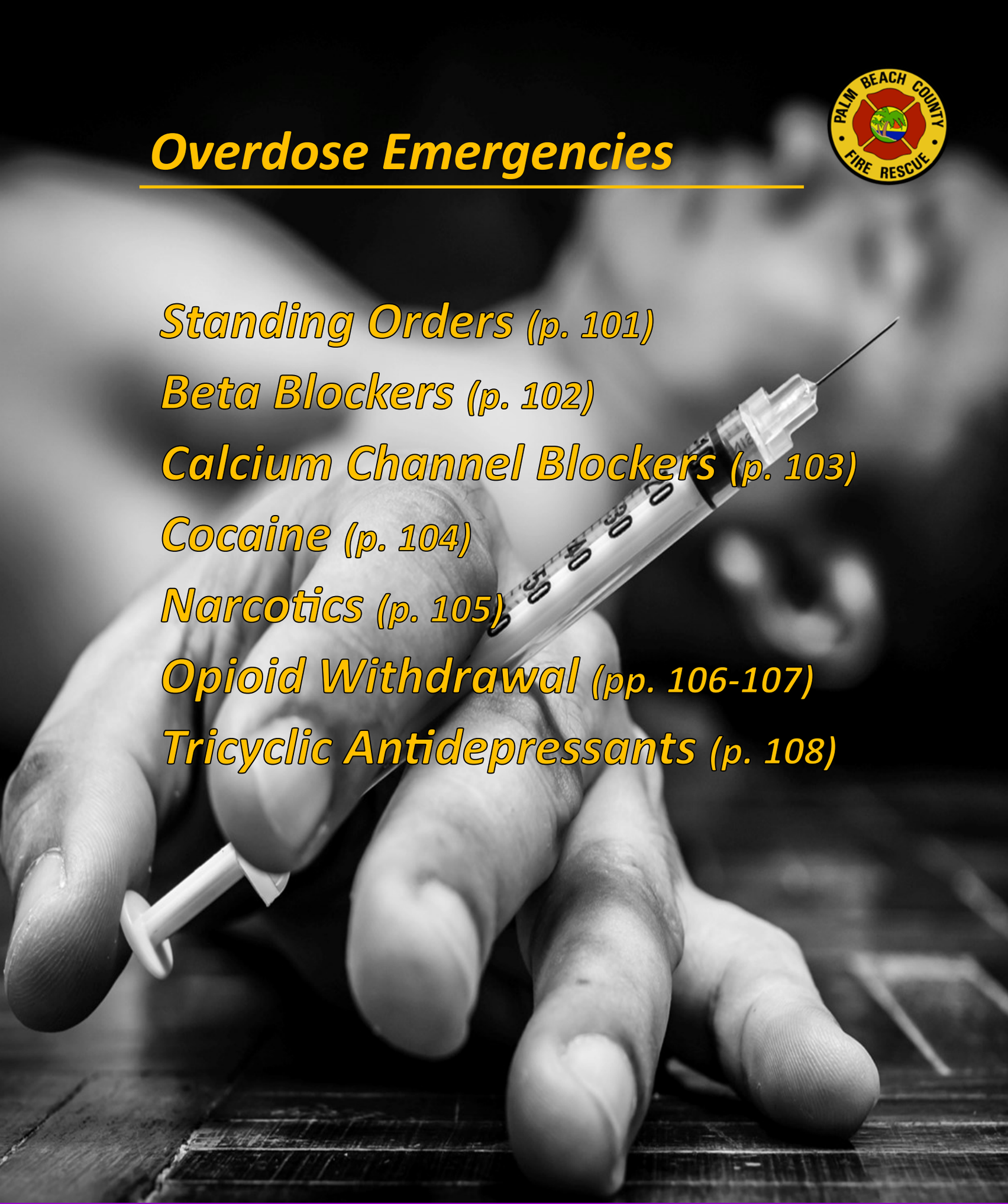
Overdose Emergencies



Standing Orders (p. 101)

Beta Blockers (p. 102)

Calcium Channel Blockers (p. 103)

Cocaine (p. 104)

Narcotics (p. 105)

Opioid Withdrawal (pp. 106-107)

Tricyclic Antidepressants (p. 108)

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INFORMATION

- The goal for effectively managing a patient with an overdose/poisoning is to:
  - Support the ABCs
  - Terminate seizures
  - Terminate any lethal cardiac arrhythmias
  - Reverse the toxic effects of the poison/medication with a specific antidote
- The treating paramedic should consider contacting the **Florida Poison Control Center** at **1-800-222-1222** as soon as possible for additional treatment recommendations.
  - Treatment recommendations from **Florida Poison Control** should be followed.
  - Document the directed treatment and the name of the representative in the ePCR narrative.
- Overdose emergencies may present with cardiac arrhythmias. A 15 lead and 12 lead ECG should be performed anytime an overdose is known or suspected.

WARNING

- **Use caution when supporting blood pressure with fluids. Many medications depress myocardial contractility and heart rate. This predisposes the patient to heart failure even with boluses as little as 500mL.**
- **It may be necessary to limit the amount of fluids the patient receives. Assess lung sounds and BP frequently.**

Beta Blocker Overdose

INFORMATION

- Signs & Symptoms:
  - Bradycardia
  - Hypotension
  - Cardiac arrhythmias
  - Hypothermia
  - Hypoglycemia
  - Seizures

Common Beta Blockers:
- Atenolol (Tenormin)
- Carvedilol (Coreg)
- Metoprolol (Lopressor, Toprol)
- Nebivolol (Bystolic)
- Propranolol (Inderal)

- Follow the appropriate protocol if patient is symptomatic and treatment is not listed below.

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

ISOLATED HYPOTENSION

- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
- Refer to the "Bradycardia" protocol (pp. 68-69), if applicable

PEDIATRIC

- Obtain 15 lead and 12 lead ECGs and leave cables connected

ISOLATED HYPOTENSION

- NORMAL SALINE:
  - 20mL/kg IV/IO. Assess lung sounds and BP frequently
  - May repeat 2x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients
- Refer to the "Bradycardia" protocol (pp. 68-69), if applicable

Calcium Channel Blocker Overdose

INFORMATION

- Signs & Symptoms:
  - Hypotension
  - Syncope
  - Seizure
  - AMS
  - Non-Cardiogenic Pulmonary Edema
  - Bradycardia
- Follow the appropriate protocol if patient is symptomatic and treatment is not listed below.

Common Calcium Channel Blockers:
- Amlodipine (Norvasc)
- DILTIAZEM (CARDIZEM)
- Felodipine (Plendil)
- Nicardipine (Cardine)
- Nifedipine (Procardia)
- Verapamil (Calan SR)

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

HYPOTENSION

- CALCIUM CHLORIDE:
  - 1g IV/IO, over 2 minutes
- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

HYPOTENSION WITH BRADYCARDIA OR NOT RESPONDING TO ABOVE TREATMENT

- Refer to the "Bradycardia" protocol (pp. 68-69), if applicable

PEDIATRIC

- Obtain 15 lead and 12 lead ECGs and leave cables connected

HYPOTENSION

- CALCIUM CHLORIDE:
  - 20mg/kg IV/IO, over 2 minutes
  - May repeat every 10 minutes until symptoms resolve. Max total dose 1g
- NORMAL SALINE:
  - 20mL/kg IV/IO. Assess lung sounds and BP frequently.
  - May repeat 2x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

HYPOTENSION WITH BRADYCARDIA OR NOT RESPONDING TO ABOVE TREATMENT

- Refer to the "Bradycardia" protocol (pp. 68-69), if applicable

Cocaine Overdose

INFORMATION

- Signs & Symptoms:
  - Tachycardia
  - Supraventricular and ventricular cardiac arrhythmias
  - Chest pain/STEMI
  - Hypertension (HTN)
  - Seizures
  - Excited delirium
  - Hyperthermia
- Follow the appropriate protocol if patient is symptomatic and treatment is not listed below.

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

PATIENT PRESENTING WITH STABLE SVT, WCT, CHEST PAIN, HTN, OR SEIZURES

- VERSED:
  - 5mg IV/IO/IN/IM
  - May repeat 1x prn, in 5 minutes
  - Contraindication - Hypotension
  - Precaution - Monitor for respiratory depression
- Follow appropriate protocol if:
  - Above treatment is unsuccessful

OR

  - If the patient has an unstable cardiac arrhythmia

PEDIATRIC

- Obtain 15 lead and 12 lead ECGs and leave cables connected

PATIENT PRESENTING WITH STABLE SVT, WCT, CHEST PAIN, HTN, OR SEIZURES

- VERSED:
  - 0.1mg/kg IV/IO. Max single dose 5mg
  - 0.2mg/kg IN/IM. Max single dose 5mg
  - May repeat either route 1x prn
  - Contraindication - Hypotension
  - Precaution - Monitor for respiratory depression

Narcotic Overdose

ADULT & PEDIATRIC

Warning:

- NARCAN is to be used PRN to improve intrinsic airway patency, ventilation, and oxygenation.
- The goal is to restore spontaneous respiration, NOT to wake the patient up.

Common Opiate Narcotics:

- FENTANYL (Duragesic)
- Codeine
- Dilaudid (Hydromorphone)
- Heroin (Diamorphine)
- Methadone (Methadose)
- Lorcet, Lortab, Vicodin (Hydrocodone)
- Oxycontin (Oxycodone)
- Percocet
- Morphine (MS Contin)
- Dilaudid (Meperidine)

Suspected Narcotic Overdose

Are ALL of the following vital signs within the below parameters?

- Spontaneous Respirations ≥ 10
- SpO_2 ≥ 93%
- $EtCO_2$ ≤ 45 mmHg

Yes

No

Monitor & Transport

Provide:

- Supplemental OXYGEN

OR

- Assist ventilations with BVM for 2 minutes, prn

Yes

- Reassess above vitals.
- Are all vitals within above parameters?

No

Yes

Secure IV/IO Access?

No

NARCAN INFUSION IV/IO:

- Adult & Pediatric:
- Dilute: 0.5mg of NARCAN in a 50mL bag of NORMAL SALINE
- Administer IV/IO utilizing a 60 gtt set, run wide open
- Reassess vital signs after 25mL administration, continue administration prn
- May repeat in 2 minute intervals to achieve vital signs listed above
- Max total dose 4mg

NARCAN (Prefilled Syringe w/MAD):

- Adult:
  - 2mg IN
- Pediatric:
  - 1mg IN
- May repeat in 5 minute intervals to achieve vital signs listed above.
- Max total dose 8mg

OR

NARCAN IM:

- Adult:
  - 2mg IM
- Pediatric:
  - 1mg IM
- May repeat in 5 minute intervals to achieve vital signs listed above.
- Max total dose 4mg

OR

NARCAN (NASAL SPRAY) – ADULT ONLY:

- 4mg IN
- May repeat in 5 minute intervals to achieve vital signs listed above.
- Max total dose 8mg

Opioid Withdrawal

INFORMATION

- The following procedure is authorized for a patient that has recently used opioids and is experiencing withdrawal symptoms on the Clinical Opiate Withdrawal Scale (COWS)
- Assess patient for any of the following exclusionary criteria:
  - Altered mental status/no capacity
  - Unwilling to give name, DOB, and phone number for follow up
  - Unwilling to be transported to the hospital
  - Pregnant
  - Taken methadone within the past 48 hours

ADULT

- Calculate a Clinical Opiate Withdrawal Scale (COWS) score
  - Score < 5
    - Monitor and transport
  - Score ≥ 5
    - Attempt to obtain verbal consent for administration of SUBOXONE
    - If patient declines, patient is **NOT** eligible for SUBOXONE
- SUBOXONE SUBLINGUAL:
  - 16mg SL (2 films)
  - If no response in 15 minutes, repeat with 8mg SL (1 film)
  - Contraindication - Hypersensitivity/allergy to BUPRENORPHINE **OR** NALOXONE

Clinical Opiate Withdrawal Scale (COWS)

RESTING PULSE RATE: *Measured after patient is sitting or lying for one minute* **0** - pulse rate 80 or below **1** - pulse rate 81-100 **2** - pulse rate 101-120 **4** - pulse rate greater than 120	**SWEATING:** *Over past ½ hour not secondary to room temperature or patient activity* **0** - no report of chills or flushing **1** - subjective report of chills or flushing **2** - flushed or observable moistness on face **3** - beads of sweat on brow or face **4** - sweat streaming off face	**RESTLESSNESS:** *Observation during assessment* **0** - able to sit still **1** - reports difficulty sitting still, but is able to do so **2** - frequent shifting or extraneous movements of legs/arms **5** - Unable to sit still for more than a few seconds
PUPIL SIZE: **0** - pupils pinpoint or normal size for room light **1** - pupils possibly larger than normal for room light **2** - pupils moderately dilated **5** - pupils so dilated that only the rim of the iris is visible	**BONE OR JOINT ACHES:** *If patient was having pain previously, only the additional component attributed to opiates withdrawal is scored* **0** - not present **1** - mild diffuse discomfort **2** - patient reports severe diffuse aching of joints/ muscles **3** - patient is rubbing joints or muscles and is unable to sit still because of discomfort	**RUNNY NOSE OR TEARING:** *Not accounted for by cold symptoms or allergies* **0** - not present **1** - nasal stuffiness or unusually moist eyes **2** - nose running or tearing **4** - nose constantly running or tears streaming down cheeks
GI UPSET: *Over last ½ hour* **0** - no GI symptoms **1** - stomach cramps **2** - nausea or loose stool **3** - vomiting or diarrhea **5** - multiple episodes of diarrhea or vomiting	**TREMOR:** *Observation of outstretched hands* **0** - No tremor **1** - tremor can be felt, but not observed **2** - slight tremor observable **4** - gross tremor or muscle twitching	**YAWNING:** *Observation during assessment* **0** - no yawning **1** - yawning once or twice during assessment **2** - yawning three or more times during assessment **4** - yawning several times/minute
ANXIETY/IRRITABILITY: **0** - none **1** - patient reports increasing irritability or anxiousness **2** - patient obviously irritable anxious **4** - patient so irritable or anxious that participation in the assessment is difficult	**GOOSEFLESH SKIN:** **0** - skin is smooth **3** - piloerrection of skin can be felt or hairs standing up on arms **5** - prominent piloerrection of skin	**Total COWS Score:**_____
5 - 12 = Mild Withdrawal	**13 - 24 = Moderate Withdrawal**	**25 - 36 = Moderately Severe Withdrawal**
> 36 = Severe Withdrawal		

Tricyclic Antidepressant (TCA) Overdose

INFORMATION

- Signs & Symptoms:
  - Mad as a hatter
  - Red as a beet
  - Hot as hell
  - Dry as a bone
  - Blind as a bat
  - Coma
  - Seizures
  - Cardiac arrhythmia
  - Acidosis

Common TCA:
- Amitriptyline
- Desipramine
- Doxepin

- Follow the appropriate protocol if patient is symptomatic and treatment is not listed below.

ADULT

- Obtain 15 lead and 12 lead ECGs and leave cables connected

PATIENT WITH A WIDE QRS COMPLEX GREATER THAN OR EQUAL TO 0.12 SECONDS (3 SMALL BOXES)

- SODIUM BICARBONATE:
  - 100mEq IV/IO, over 2 minutes
  - If no change in 5 minutes:
    - 50mEq IV/IO, over 2 minutes
  - Max total dose 150mEq
  - Precaution - Discontinue treatment when QRS complexes are < 0.12 seconds (3 small boxes)

ISOLATED HYPOTENSION

- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

PEDIATRIC

- Obtain 15 lead and 12 lead ECGs and leave cables connected

PATIENT WITH A WIDE QRS COMPLEX GREATER THAN OR EQUAL TO 0.08 SECONDS (2 SMALL BOXES)

- SODIUM BICARBONATE:
  - 1mEq/kg IV/IO, over 2 minutes. Max single dose 50mEq
  - May repeat 2x prn, in 5 minute intervals. Max total dose 150mEq
  - Precaution - Discontinue treatment when QRS complexes are < 0.08 seconds (2 small boxes)

ISOLATED HYPOTENSION

- NORMAL SALINE:
  - 20mL/kg IV/IO. Assess lung sounds and BP frequently
  - May repeat 2x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

WARNING

TCAs cause death primarily through lethal cardiac arrhythmias. Wide QRS complexes are an ominous sign and must be treated with SODIUM BICARBONATE immediately.

Chemical Control

Behavioral Emergencies (pp. 111-113)

Pain Management (pp. 114-115)

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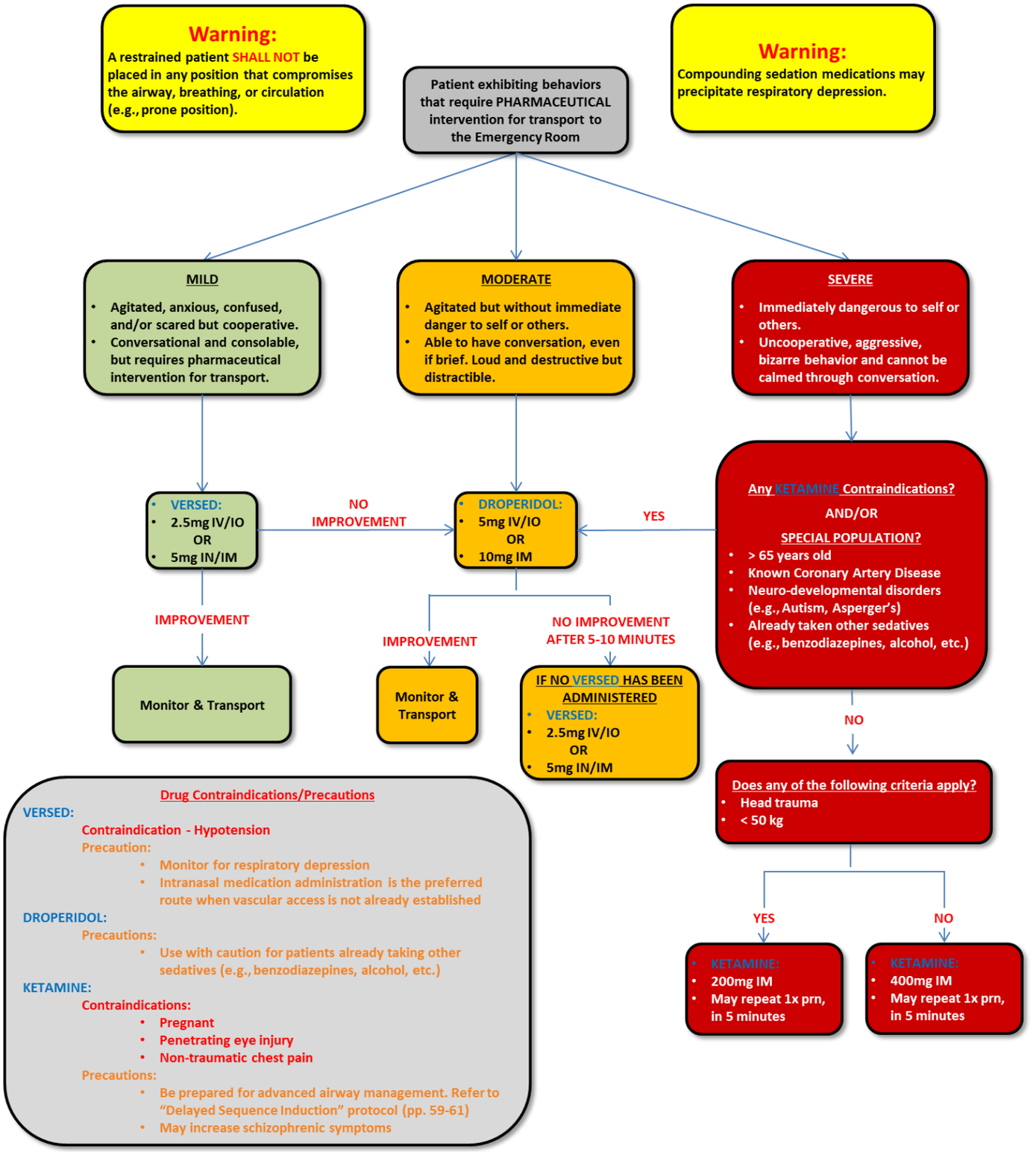
INFORMATION

- **A restrained patient SHALL NOT be placed in any position that compromises the airway, breathing, or circulation (e.g., prone position).**
- When possible, perform a detailed patient assessment prior to any medication administration.

ADULT



PEDIATRIC

Warning:
A restrained patient SHALL NOT be placed in any position that compromises the airway, breathing, or circulation (e.g., prone position).

Patients 5 YEARS OLD TO SIGNS OF PUBERTY exhibiting behaviors that require PHARMACEUTICAL intervention for transport to the Emergency Room.

Warning:
Compounding sedation medications may precipitate respiratory depression.

MILD
- Agitated, anxious, confused, and/or scared but cooperative.
- Conversational and consolable.

MODERATE
- Agitated but without immediate danger to self or others.
- Able to have conversation, even if brief. Loud and destructive but distractible.

SEVERE
- Immediately dangerous to self or others.
- Uncooperative, aggressive, bizarre behavior and cannot be calmed through conversation.

Monitor & Transport

IMPROVEMENT

VERSED:
- 0.1mg/kg IV/IO
- Max single dose 5mg
  OR
- 0.2mg/kg IN/IM
- Max single dose 5mg
- Refer to "Handtevy" system

NO IMPROVEMENT

DROPERIDOL:
- 0.1mg/kg IM
- Max single dose 5mg
- Refer to "Handtevy" system

Drug Contraindications/Precautions

VERSED:
Contraindication - Hypotension
Precaution:
- Monitor for respiratory depression
- Intranasal medication administration is the preferred route when vascular access is not already established

DROPERIDOL:
Precautions:
- Use with caution for patients already taking other sedatives (e.g., benzodiazepines, alcohol, etc.)

IMPROVEMENT

Monitor & Transport

NO IMPROVEMENT AFTER 15 MINUTES

IF NO VERSED HAS BEEN ADMINISTERED

VERSED:
- 0.1mg/kg IV/IO
- Max single dose 5mg
  OR
- 0.2mg/kg IN/IM
- Max single dose 5mg
- Refer to "Handtevy" system

WARNING
MUST contact EMS Captain for approval prior to ALL pediatric sedation medication administration.

ADULT & PEDIATRIC

POST SEDATION

- When DROPERIDOL **OR** KETAMINE is administered for sedation, the following shall be performed:
  - OXYGEN:
    - 15 LPM via NRB regardless of SpO_2
- Obtain minimum of 2 sets of Vital Signs
  - Refer to "Patient Assessment" protocol (pp. 14-15)
  - Continuous $EtCO_2$ and SpO_2 monitoring
  - Continuous cardiac monitoring
- IV access is recommended once the patient is sedated

DYSTONIC REACTION TO DROPERIDOL ADMINISTRATION

- Refer to "Dystonic Reaction" protocol (p. 39)

ADULT

PATIENT SUDDENLY WAKES UP AFTER KETAMINE ADMINISTRATION

- VERSED:
  - 5mg IV/IO/IN/IM
  - May repeat 1x prn, in 5 minutes
  - Contraindication - Hypotension
  - Precaution - Monitor for respiratory depression

HYPERSALIVATION REACTION TO KETAMINE ADMINISTRATION

- ATROPINE:
  - 0.5mg IV/IO, over 1 minute
  - May repeat prn, in 3 minute intervals. Max total dose 3mg
  - Contraindication - Bradycardia in the presence of a myocardial infarction

LARYNGOSPASM (STRIDOR) REACTION TO KETAMINE ADMINISTRATION

- Laryngospasm is uncommon and is usually self-limiting. It almost always resolves with oxygen administration
- OXYGEN:
  - 15 LPM via BVM, regardless of SpO_2
- Refer to the "Delayed Sequence Induction (DSI)" protocol (pp. 59-61) for unresolved laryngospasm

RAPID COOLING FOR EXCITED DELERIUM WITH A TEMPERATURE OF > 103 DEGREES F

- Apply ice packs to axilla and groin area
- COLD NORMAL SALINE: (if available)
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
- SODIUM BICARBONATE:
  - 100mEq IV/IO, over 2 minutes

Pain Management

INFORMATION

- FENTANYL is the front line medication for pain; however, KETAMINE is preferred for a hypotensive patient or a patient who has opiate contraindications (allergy, history of abuse, etc.).
- KETAMINE may be given with or instead of FENTANYL for severe pain.
  - ≥ 7 on the pain scale is considered "severe pain"

ADULT

PAIN MANAGEMENT

- FENTANYL:
  - 100mcg IV/IO/IN/IM
  - May repeat 2x prn, in 5 minute intervals
    - Contraindication - Pregnancy near term (32 weeks or greater) or in active labor
    - Precautions:
      - History of opiate abuse or drug seeking behavior
      - Monitor patient for respiratory depression
      - Discontinue if patient becomes drowsy
      - Can be reversed with NARCAN if necessary

SEVERE PAIN MANAGEMENT (PAIN SCALE 7 OR HIGHER)

- KETAMINE INFUSION:
  - **Dilute**: 25mg of KETAMINE in a 50mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
    - Reassess pain scale after 25mL of the infusion has been administered
      - Continue infusion if needed
    - May repeat 2x prn
    - Contraindications:
      - Pregnant
      - Penetrating eye injury
      - Non-traumatic chest pain
    - Precautions:
      - Be prepared for advanced airway management. Refer to "Delayed Sequence Induction" protocol (pp. 59-61)
      - Rapid IV administration is associated with respiratory depression, apnea, and higher than usual increases in blood pressures
      - May increase schizophrenic symptoms

OR

UNABLE TO ESTABLISH VASCULAR ACCESS

- KETAMINE:
  - 25mg IN/IM
  - May repeat 2x prn, in 5 minute intervals
    - Contraindications - as noted above
    - Precautions - as noted above

IO INFUSION PAIN MANAGEMENT

- LIDOCAINE:
  - 40mg IO, over 2 minutes
    - **DO NOT** dilute
    - Allow LIDOCAINE to dwell in IO space for 1 minute
    - Flush with 10mL of NORMAL SALINE
  - May repeat at 20mg IO, 1x prn

PEDIATRIC

PAIN MANAGEMENT

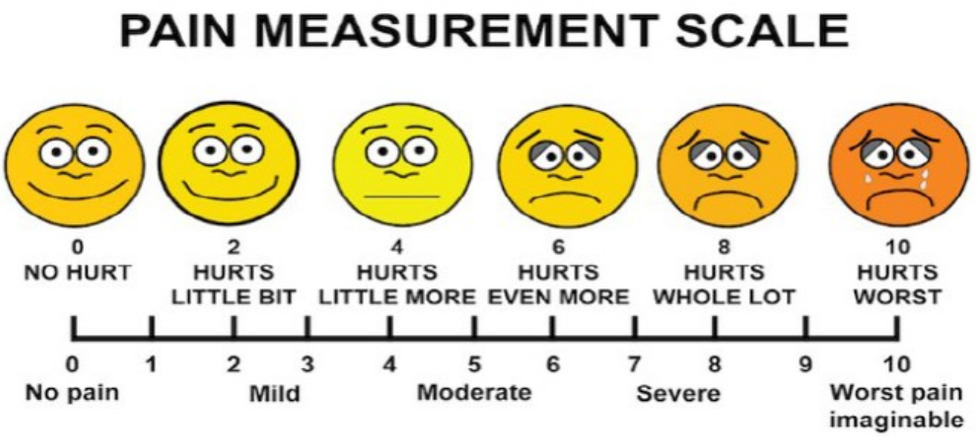
- FENTANYL:
  - 1mcg/kg IV/IO, over 2 minutes
  - 1.5mcg/kg IN/IM
  - Max single dose 100mcg
  - May repeat either route 1x prn, in 5 minutes. Max total dose 200mcg
  - Contraindication:
    - ≤ 6 months old
  - Precautions:
    - Monitor patient for respiratory depression
    - Discontinue if patient becomes drowsy
    - Can be reversed with NARCAN if necessary

SEVERE PAIN MANAGEMENT (PAIN SCALE 7 OR HIGHER)

- KETAMINE (≥ 3 years old):
  - 1mg/kg IN/IM
  - Max single dose 25mg
  - May repeat 1x prn, in 5 minutes. Max total dose 50mg
  - Contraindications:
    - Penetrating eye injury
    - Non-traumatic chest pain
  - Precautions:
    - Be prepared for advanced airway management. Refer to "Delayed Sequence Induction" protocol (pp. 59-61)
    - May increase schizophrenic symptoms

IO INFUSION PAIN MANAGEMENT

- LIDOCAINE:
  - 0.5mg/kg IO, over 2 minutes
    - **DO NOT** dilute
    - Allow LIDOCAINE to dwell in IO space for 1 minute
    - Flush with 10mL of NORMAL SALINE
    - Max single dose 40mg
  - May repeat at 0.25mg/kg IO, 1x prn



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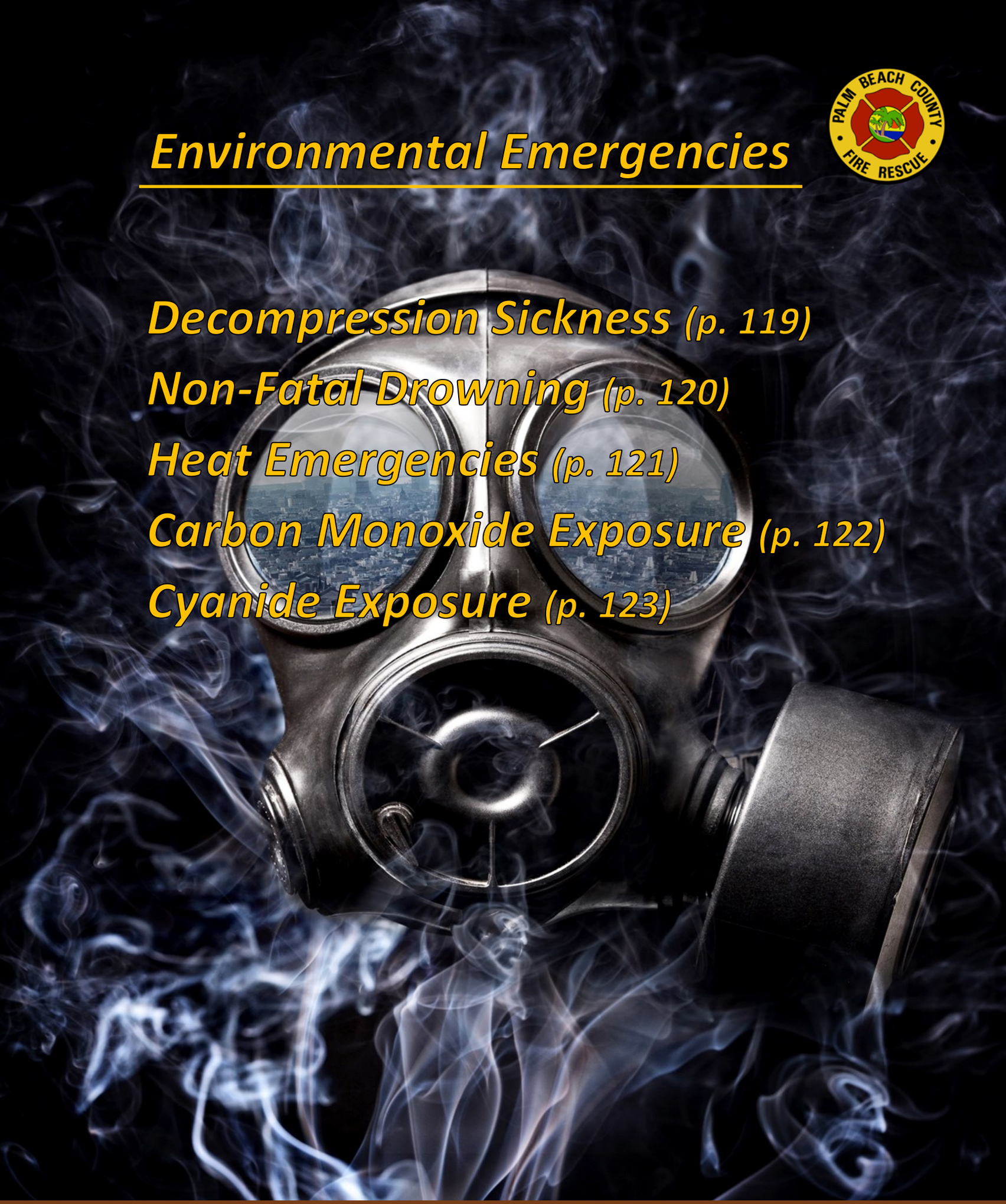
Environmental Emergencies



Decompression Sickness (p. 119)
Non-Fatal Drowning (p. 120)
Heat Emergencies (p. 121)
Carbon Monoxide Exposure (p. 122)
Cyanide Exposure (p. 123)

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Decompression Sickness

INFORMATION

- Signs & Symptoms:
  - Stroke-like symptoms
  - Visual disturbances
  - AMS
  - Paralysis or weakness
  - Numbness/tingling
  - Bowel/bladder dysfunction
- Any patient with the above signs & symptoms who has used SCUBA gear or compressed air within a 48-hour period shall be considered a decompression sickness patient.
- Transport to St. Mary's Hyperbaric Chamber (encode prior to transport to confirm availability).
  - If unavailable, transport to closest ED
- Contact **DAN (Diver Alert Network)** at **(919) 684-4326** for medical consultation as needed.
  - Treatment recommendations from **DAN (Diver Alert Network)** should be followed
  - Document the treatment and the name of the representative in the ePCR narrative
- Try to obtain an accurate history of the dive:
  - **D**epth of dives
  - **A**ir mixture type in tanks
  - **N**umber of dives
  - **I**nterval between dives
- All dive equipment must be brought to the hospital.

ADULT & PEDIATRIC

- POSITIONING:
  - Transport patient in a supine position
- For cardiac arrhythmias, refer to appropriate protocol
- Rule out a tension pneumothorax
- OXYGEN
  - 15 LPM via NRB, regardless of SpO_2
- NORMAL SALINE:
  - Adult:
    - 500mL IV/IO, regardless of the blood pressure
  - Pediatric:
    - 10mL/kg IV/IO, regardless of the blood pressure. Max total dose 250mL

Non-Fatal Drowning

INFORMATION

- Consider spinal motion restriction in the presence of trauma (e.g., diving, rough surf, vehicle accident with subsequent submersion, etc.).
- All non-fatal drowning patients shall be transported to the hospital.

ADULT & PEDIATRIC

PULMONARY EDEMA SECONDARY TO NON-FATAL DROWNING

- CPAP 10cmH_2O
  - Contraindications:
    - SBP < 90 mmHg
    - Without spontaneous respirations
    - Decreased LOC (lethargic)
    - < 30 kg

PATIENT REQUIRES BVM ASSISTED VENTILATIONS AND IS NORMOTENSIVE

- PEEP 10cmH_2O
  - Contraindications:
    - Cardiac Arrest
    - Trauma
    - Hypotension

PATIENT IS HYPOTENSIVE WITH CLEAR LUNG SOUNDS

- NORMAL SALINE:
  - Adult:
    - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
    - May repeat 1x prn
    - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
  - Pediatric:
    - 20mL/kg IV/IO. Assess lung sounds and BP frequently
    - May repeat 2x prn, for age appropriate hypotension

PATIENT IS HYPOTENSIVE WITH PULMONARY EDEMA

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - Adult:
    - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
      - Administer 1mL/minute IV/IO
      - Titrate to maintain SBP 100 mmHg. Max total dose 300mcg (30mL)
    - Contraindication - Hypotension secondary to blood loss
    - Precautions:
      - Rapid (< 2 minutes) onset, short (5-10 minute) duration
      - Monitor heart rate and blood pressure throughout administration
  - Pediatric:
    - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
      - Administer 1mL/minute IV/IO
      - Titrate to maintain age appropriate SBP. Max total dose 300mcg (30mL)
    - Contraindication - Hypotension secondary to blood loss
    - Precautions:
      - **DO NOT** administer faster than 1mL/minute
      - Rapid (< 2 minutes) onset, short (5-10 minute) duration
      - Monitor heart rate and blood pressure throughout administration

Heat Emergencies

INFORMATION

- A patient with a heat-related illness associated with Altered Mental Status (AMS) should be considered to have heat stroke once all the other possibilities for the AMS have been ruled out (hypoglycemia, drugs/alcohol, trauma, etc.).

ADULT & PEDIATRIC

When treating heat stroke:

"COOL FIRST, TRANSPORT SECOND"

ALL HEAT EMERGENCIES

- Move patient into the back of the rescue as soon as possible. Decrease the air-conditioning temperature in the patient compartment.
- Obtain a temperature
  - Rectal temperature will provide the most accurate core temperature
- Remove excessive clothing
- Provide oral hydration (preferably water) if patient is able to swallow and follow commands
  - Oral hydration may affect accuracy of oral temperature readings

HEAT CRAMPS AND/OR HEAT EXHAUSTION

- Apply ICE PACKS to forehead, neck, axilla, forearms, hands, and groin area
- NORMAL SALINE:
  - Adult:
    - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
    - May repeat 1x prn
    - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
  - Pediatric:
    - 20mL/kg IV/IO. Assess lung sounds and BP frequently
    - May repeat 2x prn, for age appropriate hypotension
    - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

HEAT STROKE WITH TEMPERATURE > 103 DEGREES F / AMS / SEIZURES / HYPOTENSION

- Active cooling shall be performed to achieve a core temperature of less than 103 degrees F
- Initiate Rapid Cooling:
  - Place patient in "Mega-Mover"
  - Cover patient with ice or iced water immediately utilizing the ice cooler from the apparatus
- If above treatment is unavailable, apply ICE PACKS to forehead, neck, axilla, forearms, hands, and groin area
- NORMAL SALINE: (COLD NORMAL SALINE preferred, if available)
  - Adult:
    - 1L IV/IO. Assess lung sounds and BP frequently.
    - May repeat 1x prn
    - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
  - Pediatric:
    - 20mL/kg IV/IO. Assess lung sounds and BP frequently
    - May repeat 2x prn, for age appropriate hypotension

Carbon Monoxide Exposure

INFORMATION

- All rescuing crew members shall wear their SCBA if the patient is in a hazardous environment.
- Carbon Monoxide (CO) properties:
  - Chemical asphyxiant
  - Colorless
  - Odorless
  - Tasteless
  - Slightly less dense than air
- Toxic to humans when encountered in concentrations above **35 parts per million (ppm)**
- Lower doses of CO can also be harmful due to a cumulative effect
- Patients exposed to carbon monoxide in ventilation limited environments, require a full head to toe patient examination including SpCO monitoring with the rainbow sensor.
- Potential sources of carbon monoxide include, but are not limited to:
  - Internal combustion vehicle exhaust
  - Gasoline powered equipment
  - Propane/gas appliances and equipment
  - Structure fires

ADULT & PEDIATRIC

- Apply rainbow sensor and obtain SpCO readings
- OXYGEN:
  - 15 LPM via NRB, regardless of SpO_2, unless the patient requires ventilatory support

SPCO > 20% OR PATIENT PRESENTS WITH ANY OF THE FOLLOWING SYMPTOMS

- Headache
- Nausea/Vomiting
- Dizziness
- Altered Mental Status
- Chest pain
- Dyspnea
- Visual Disturbances
- Seizures
- Syncope

- Transport to St. Mary's Hyperbaric Chamber (encode prior to transport to confirm availability)
  - If unavailable, transport to closest ED.

WARNING

- **Patient with CO exposure can have normal pulse oximetry readings and still be hypoxic.**
- **Strong consideration for hyperbaric treatment should be given to all pediatric and obstetrical patients with confirmed CO exposures due to their higher susceptibility to the effects of CO exposures regardless of SpCO level or symptoms.**

Cyanide Exposure

INFORMATION

- Signs & Symptoms:
  - AMS
  - Pupil Dilation
  - General Weakness
  - Confusion
  - Bizarre behavior
  - Excessive sleepiness
  - Coma
  - Shortness of breath
  - Headache
  - Dizziness
  - Seizures
- Cyanide exposures may result from inhalation, ingestion, or absorption from various cyanide containing compounds.
- Consider Cyanide Exposure for patients exposed to byproducts of open combustion in an enclosed space. (e.g., structure fire).
- Direct cyanide exposure (non-smoke inhalation) is a Hazardous Materials Incident.
- Cyanokits are located on the EMS Captain and Special Operations vehicles.
- Refer to "Palm Beach Regional - Hazardous Materials Toxicology Medical Protocols".

ADULT & PEDIATRIC

CONFIRMED OR SUSPECTED CYANIDE EXPOSURE

- OXYGEN:
  - 15 LPM via NRB, regardless of SpO_2, unless the patient requires ventilatory support
- CYANOKIT:
  - Adult:
    - Preparation:
      - Reconstitute 5g vial by adding 200mL of NORMAL SALINE to the vial by using the transfer spike.
      - With the vial in the upright position, fill to the "fill line"
      - Mix the solution by rocking or rotating the vial for 30 seconds. **DO NOT SHAKE**
      - Use vented IV tubing and infuse as indicated below
    - 5g IV/IO, infused over 10-15 minutes
    - 5gtts/sec (broken infusion stream)
    - May repeat 1x prn.
    - The Cyanokit should be administered through a separate, dedicated IV/IO line
  - Pediatric:
    - Preparation and dosing - Refer to "Handtevy" system
    - May repeat 1x prn
    - The Cyanokit should be administered through a separate, dedicated IV/IO line
- Transport to St. Mary's Hyperbaric Chamber (encode prior to transport to confirm availability)
  - If unavailable, transport to closest ED
  - **HAZMAT contaminated patients will not be transported by air**

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Trauma Emergencies

Trauma Standing Orders (p. 127)

Trauma Arrest (p. 128)

Whole Blood Transfusion/TXA (pp. 129-130)

RAMP Triage (p. 131)

Adult Trauma Alert Criteria (p. 132)

Pediatric Trauma Alert Criteria (p. 133)

Burn Injuries (pp. 134-135)

Chest Trauma (p. 136)

Head Injuries (pp. 137-138)

Open Fractures (p. 139)

Unstable Pelvic Fractures (p. 140)

Traumatic Hemorrhagic Shock (p. 141)

Neurogenic Shock (p. 142)

Trauma in Pregnancy (p. 143)

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ADULT & PEDIATRIC

- The following conditions should be managed as soon as they are discovered:
  - **M**-Massive hemorrhage
  - **A**-Airway control
  - **R**-Respiratory Support
  - **C**-Circulation
  - **H**-Head Injury/Hypothermia
- Trauma Protocols should run concurrent with each other as applicable for multi-system trauma.
- Unless otherwise noted, IV fluids should be given for a SBP < 90 mmHg and at a rate (boluses) necessary to maintain peripheral pulses (which is typically a SBP of 80-90 mmHg).
  - When available, warmed IV fluids are preferred

FINGER THORACOSTOMY

- If finger thoracostomy is performed, and a large volume of blood is immediately produced, **DO NOT** allow the blood to completely drain.
  - Immediately cover the incision site with an occlusive dressing and continue resuscitation attempts.

TRAUMA ARREST

- Every attempt at controlling massive external hemorrhage shall be made.
- Once patient is on the stretcher and being transported, **DO NOT** terminate efforts for any reason until patient is received by the Trauma facility.
- Bilateral finger thoracostomy should be performed prior to application of the LUCAS Compression Device.

ULTRASOUND IN TRAUMA ARREST

- Ultrasound should be utilized to assess for cardiac motion in PEA ≥ 20 beats per minute
  - Organized rhythm **WITH** cardiac motion present:
    - Refer to “Post Resuscitation” protocol (pp. 90-91 & pp.93-94)
  - Organized rhythm **WITHOUT** cardiac motion present:
    - Continue resuscitation efforts
- **DO NOT** delay performing a finger thoracostomy, regardless of cardiac motion

Traumatic Arrest

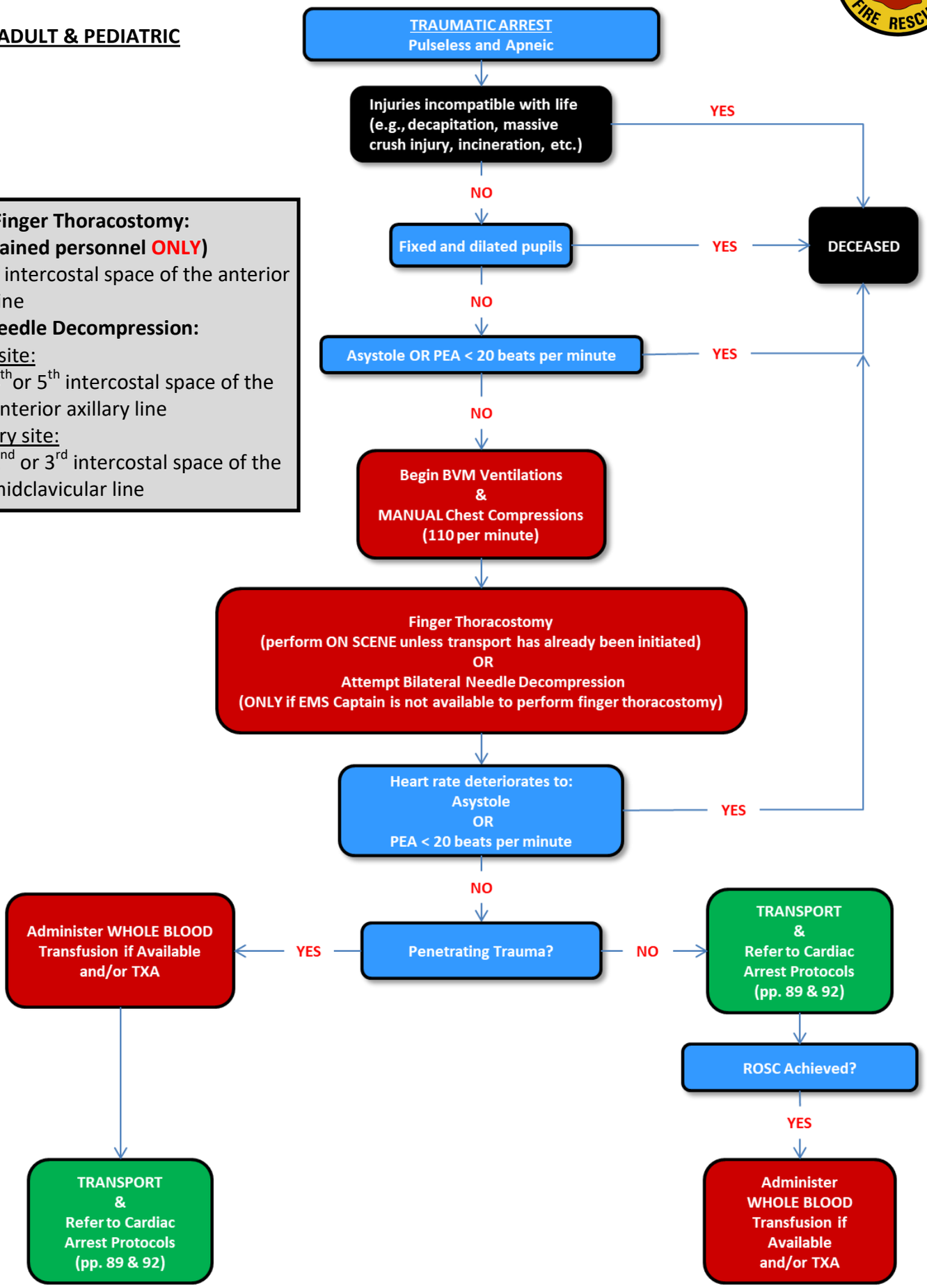
ADULT & PEDIATRIC

Finger Thoracostomy:
(Trained personnel ONLY)

- 4th or 5th intercostal space of the anterior axillary line

Needle Decompression:

- Primary site:
  - 4th or 5th intercostal space of the anterior axillary line
- Secondary site:
  - 2nd or 3rd intercostal space of the midclavicular line



Whole Blood Transfusion/TXA

INFORMATION

- In the event of a massive hemorrhage, WHOLE BLOOD/TRANEXAMIC ACID (TXA) is the preferred treatment. Every attempt at controlling the hemorrhage shall be made prior to transfusion.
- EMS Captains/Flight Crew will be administering Low Titer Leukoreduced O+ WHOLE BLOOD.
- This protocol shall be run concurrent with the "Traumatic Hemorrhagic Shock" (p. 141) and "Medical Hemorrhagic Shock" protocols (p. 43), as applicable.

ADULT & PEDIATRIC

- WHOLE BLOOD/TRANEXAMIC ACID (TXA) shall be considered for:
  - Any patient in traumatic arrest (PEA ≥ 20 beats per minute) secondary to:
    - Penetrating trauma **WITHOUT** conclusive signs of death
    - Blunt trauma **AND** ROSC has been achieved

  OR

  - Any patient with evidence/suspicion of massive hemorrhage **AND** one of the following:
    - Adult:
      - Systolic Blood Pressure (SBP) < 70 mmHg
      - Systolic Blood Pressure (SBP) < 90 mmHg **AND** Heart Rate (HR) ≥ 110 BPM
      - EMS Captain/Flight Crew discretion
    - Pediatric:
      - Refer to the "Handtevy" system for pediatric WHOLE BLOOD/TXA administration criteria
      - EMS Captain/Flight Crew discretion
- Special Considerations:
  - Attempt to obtain verbal consent for administration of WHOLE BLOOD
  - If objection to receiving WHOLE BLOOD occurs (e.g., religion), withhold and refer to "Traumatic Hemorrhagic Shock" (p. 141) and "Medical Hemorrhagic Shock" protocols (p. 43), as applicable

- **Consideration to WHOLE BLOOD administration should be given to patients who are prescribed Beta Blockers and/or Calcium Channel Blockers with a HR < 110 beats per minute.**

WARNING
Blood Transfusion Adverse Reaction

MILD - GENERALIZED URTICARIA ONLY

- **Refer to the "Allergic Reaction" protocol (pp. 35-36)**
- **Continue transfusion with caution**

SEVERE - ANY REACTION OTHER THAN GENERALIZED URTICARIA

- **STOP TRANSFUSION IMMEDIATELY**
  - **Disconnect all blood products from patient including Y-tubing and secure in red bag**
  - **Disconnect all used IV tubing**
  - **DO NOT discard the unused blood or used IV tubing**
  - **Utilize new/unused IV tubing to administer alternate IV fluids**
  - **The EMS Captain/Flight Crew shall ensure the blood products with all tubing will be packaged in the appropriate material and returned to the blood bank.**
- **Refer to the appropriate protocol for treatment**

Whole Blood Transfusion/TXA *continued….*

ADULT & PEDIATRIC

- If blood products are given, the EMS Captain shall accompany the patient to the receiving ED with the exception of Flight Crews.
- **DO NOT** delay transport to ED to initiate blood products.
- IV is the preferred route of administration.
- Establish bilateral vascular access IV/IO, utilizing largest catheter size possible.
  - IO access shall be utilized if unable to establish IV access.
- Record baseline vitals to include:
  - Temperature pre & post transfusion
  - NIBP in 5 minute intervals
  - Cardiac Monitor
  - SpO_2 & $EtCO_2$

WARNING
DO NOT use lower extremity IO sites if femur/pelvic fracture is suspected.

PREPARATION

- Blood tubing set with filter connected to 250mL of NORMAL SALINE utilizing "Y tubing"
- Connect tubing directly to hub of IV/IO catheter
- 2 EMS personnel must confirm the tag and the blood product match
  - Both confirming personnel shall sign the accompanying blood component tag

ADMINISTRATION

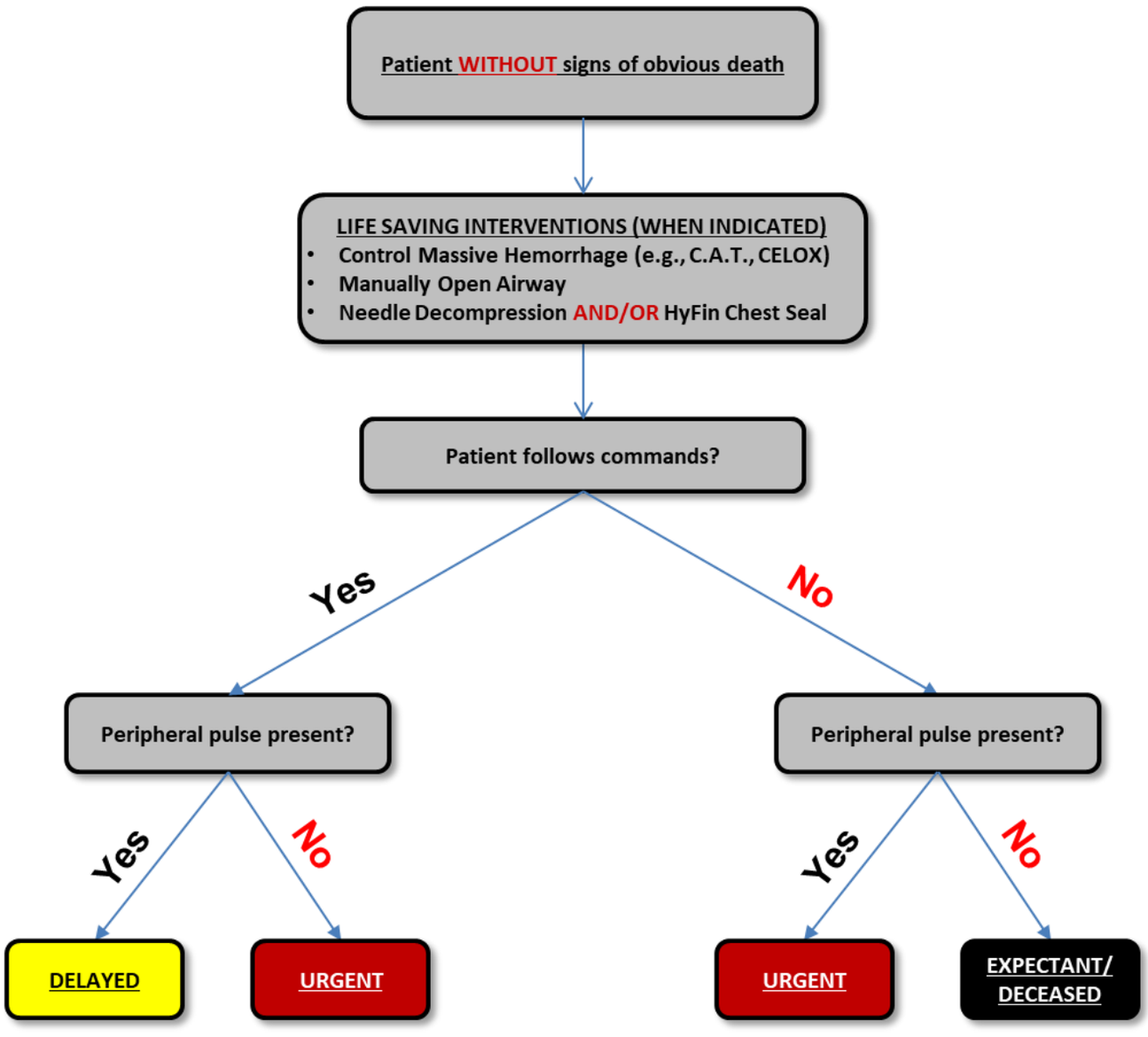
- Flow blood products through blood warmer to completion
- Pressure infuser or LifeFlow fluid infuser shall be utilized
- Document transfusion start time
- WHOLE BLOOD:
  - Adult:
    - 1 unit IV/IO
      - May repeat 1x prn. Max total dose 2 units
  - Pediatric:
    - 5 years old to signs of puberty:
      - 10mL/kg IV/IO
      - May repeat 1x prn. Max total dose 1 unit
      - LifeFlow delivers 10mL per squeeze of the trigger
    - < 5 years old
      - Contact the On-Call Medical Director for orders to administer WHOLE BLOOD

POST TRANSFUSION

- Stop blood product and flush line with 10-20mL of NORMAL SALINE
- Document stop time and post transfusion vitals including temperature
- TRANEXAMIC ACID (TXA) INFUSION: (**WITH OR WITHOUT** WHOLE BLOOD)
  - Adult:
    - **Dilute**: 2g of TXA in a 50mL bag of NORMAL SALINE
    - Administer IV/IO by utilizing a 60 gtt set, run wide open
  - Pediatric: (5 years old to signs of puberty)
    - **Dilute**: 15mg/kg of TXA in a 50mL bag of NORMAL SALINE. Max single dose 1g
    - Administer IV/IO by utilizing a 60 gtt set, run wide open
  - Contraindications:
    - Time of injury > 3 hours
    - Gastrointestinal (GI) bleeding
  - Precaution - **DO NOT** administer in same IV/IO line as WHOLE BLOOD without thoroughly flushing

INFORMATION

- Rapid Assessment of Mentation and Pulse
- Ensure "Walking Wounded" (GREEN) are escorted to the Treatment Area.
- A Secondary Triage Assessment shall be performed on all patients in the Treatment Area.
- Evaluate infants first in secondary triage due to potential for rapid decompensation.



CONTAMINATED PATIENTS
Ensure contaminated patients are decontaminated prior to entry into Treatment Area.

Adult Trauma Criteria

ADULT TRAUMA TRIAGE CRITERIA

ANY 1 IN THIS CATEGORY (RED)

- Active airway assistance[1] or respiratory rate < 10 or > 29 breaths per minute
- Lack of radial pulse with a sustained HR > 120 beats per minute or SBP < 90 mmHg
- Glascow Coma Scale (GCS) ≤ 13 or presence of paralysis, suspicion of spinal cord injury, or loss of sensation
- 2nd or 3rd degree burns to 10% or more TBSA*
- Amputation at or above the wrist or ankle*
- Any penetrating injury to the head, neck, or torso[3]*
- Penetrating injury to the extremity at or above the elbow or knee*
- GSW to the extremity at or above the wrist or ankle*
- Chest wall instability or deformity (flail chest)
- Crushed, mangled, degloved, or pulseless extremity
- Fracture of two or more long bones[4]
- Unstable pelvic fractures*
- Severe facial injury/fractures with potential airway compromise
- Blunt abdominal or chest trauma in patient with history of paralysis (paraplegia or quadriplegia)*
- Pregnancy ≥ 20 weeks with abdominal pain after blunt trauma[5]
- Electrocution or lightning injury with loss of consciousness or visible signs of injury

ANY 2 IN THIS CATEGORY (BLUE)

- Sustained heart rate of ≥ 120 beats per min
- Head injury with loss of consciousness, amnesia, or new altered mental status
- Soft tissue loss[2]
- Non GSW penetrating injury to the extremities distal to the elbow or distal to the knee
- Single long bone fracture site due to MVC[4]
- Single long bone fracture or pelvic fracture in patient with bleeding disorder or on anticoagulants
- 55 years or older
- Ejection or thrown from automobile, motorcycle, or golf cart
- Ejection or thrown from a horse with anatomical injury
- Death in same passenger compartment*
- Intrusion including roof: > 12 inches at occupant site or > 18 inches at any other site into the passenger compartment*
- Vehicle telemetry data consistent with high risk of injury[6]*
- Fall 10ft or more
- Auto vs. pedestrian/bicyclist thrown, run over, or with impact and signs of anatomical injury
- Motorcycle, golf cart, or ATV crash with signs of anatomical injury

Any one (1) or more **RED** = "Trauma Alert"; Any two (2) or more **BLUE** = "Trauma Alert"

1. Airway assistance includes manual jaw thrust, continuous suctioning, or use of other adjuncts to assist ventilatory efforts.
2. Includes deep flap avulsion (>5 inches)
3. Excluding superficial wounds of the head and torso in which the depth of the wound can be determined.
4. Long bone fracture sites are defined as the (1) shaft of the humerus, (2) radius and ulna, (3) femur, (4) tibia and fibula.
5. Pregnant patients meeting Trauma Alert criteria should be transported to St. Mary's Trauma Center by air whenever possible.
6. Vehicle Telemetry Data, when available can be relayed to dispatch; the data can assist in predicting potential serious injuries from the data collected at the time of the crash.

- In the event that a patient does not meet either 1 Red or 2 Blue criteria during the assessment of the trauma patient, the paramedic can call a trauma alert if, in his/her judgement, the patient's condition warrants such an action. Where paramedic judgement is used, it shall be documented.
- **Any of the above criteria that has an asterisk (*) next to it represents criteria that is the same for both Adult & Pediatric**

Pediatric Trauma Criteria

PEDIATRIC TRAUMA TRIAGE CRITERIA (PEDIATRIC ≤ 15 YEARS OF AGE)

ANY 1 IN THIS CATEGORY (RED)

- Active airway assistance[1] or respiratory rate < 20 in infants, respiratory rate < 10 in children 1-15 years old
- Faint or non-palpable carotid or femoral pulse or SBP < 50 mmHg
- Altered mental status[2], presence of paralysis, suspicion of spinal cord injury, or loss of sensation
- Major soft tissue disruption[5] or major flap avulsion
- 2nd or 3rd degree burns to 10% or more TBSA*
- Any penetrating injury to the head, neck, or torso[3]*
- Penetrating injury to the extremity at or above the elbow or knee*
- GSW to the extremity at or above the wrist or ankle*
- Amputation at or above the wrist or ankle*
- Open long bone fracture, multiple fracture sites, or multiple dislocations[4]
- Unstable pelvic fracture*
- Severe facial injury with potential airway compromise
- Blunt abdominal or chest trauma in patient with history of paralysis (paraplegia or quadriplegia)*
- Blunt head, chest, abdominal trauma in patient with bleeding disorder or on anticoagulants
- Auto vs. pedestrian/bicyclist thrown, run over, or with impact and signs of anatomical injury
- Ejection from automobile, ATV, golf cart, or horse with signs of anatomical injury
- Electrocution or lightning strike

ANY 2 IN THIS CATEGORY (BLUE)

- Weight ≤ 20 kg
- Carotid or femoral pulses palpable, but the radial or pedal pulse not palpable or SBP < 90 mmHg
- Loss of consciousness or amnesia
- Penetrating injury to the extremities distal to the elbow or distal to the knee
- Single long bone fracture or dislocation due to MVC[4] or pelvic fracture in patient with bleeding disorder or on anticoagulants
- Ejection (partial or complete) from automobile
- Death in same passenger compartment*
- Intrusion including roof: > 12 inches at occupant site or > 18 inches at any other site into the passenger compartment*
- Vehicle telemetry data consistent with high risk of injury[6]*
- Fall > 10 feet or 2-3 times the height of the child

Any one (1) or more **RED** = "Trauma Alert"; Any two (2) or more **BLUE** = "Trauma Alert"

1. Airway assistance includes manual jaw thrust, continuous suctioning, or use of other adjuncts to assist ventilatory efforts.
2. Altered mental status include drowsiness, lethargy, inability to follow commands, unresponsiveness to voice, totally unresponsive.
3. Excluding superficial wounds of the head and torso in which the depth of the wound can be determined.
4. Long bone fracture sites are defined as the (1) shaft of the humerus, (2) radius and ulna, (3) femur, (4) tibia and fibula.
5. Includes major de-gloving injury
6. Vehicle Telemetry Data when available can be relayed to dispatch; the data can assist in predicting potential serious injuries from the data collected at the time of the crash.

- In the event that a patient does not meet either 1 Red or 2 Blue criteria during the assessment of the trauma patient, the paramedic can call a trauma alert, if in his/her judgement, the patient's condition warrants such an action. Where paramedic judgement is used, it shall be documented.
- **Any of the above criteria that has an asterisk (*) next to it represents criteria that is the same for both Adult & Pediatric**

Burn Injuries

INFORMATION

- Assess and treat life threatening associated trauma.
- Prepare for advanced airway management for any patient who is demonstrating signs of respiratory distress **AND** any of the following: (Refer to "Delayed Sequence Induction" protocol, pp. 59-61)
  - Deep facial burns
  - Carbonaceous sputum
  - Singed eyebrows or hair
  - Hoarseness or stridor
  - Burns inside the mouth, difficulty swallowing
  - Concern for progressive edema during transport
  - Large burns (TBSA burn > 40-50%)

1st DEGREE BURNS

- Involves only the epidermis and are characterized as red and painful.

2nd DEGREE BURNS

- Involves the epidermis and varying portions of the underlying dermis with blisters.
- Appearance: wet, weepy, glossy, shiny, and pink in color

3rd DEGREE BURNS

- Involves deep tissue damage involving all layers.
- Appearance: pale, white or charred, dry, and leathery (regardless of race or skin color)

ADULT & PEDIATRIC

- **Never apply ice directly to burns**
- **DO NOT** attempt to remove anything adhered to the skin (e.g., tar, clothing, etc.)
- **DO NOT** use IM route for medication administration in or distal to affected area
- Avoid establishing IV/IO in or distal to affected area
- Remove jewelry and watches from burned area
- Consider the following protocols: Pain Management, Carbon Monoxide, and Cyanide Exposure

1st DEGREE BURNS

- Stop the burning process by irrigating with room temperature water

2nd or 3rd DEGREE BURNS < 10% TBSA

- Apply a dry sterile dressing

2nd or 3rd DEGREE BURNS ≥ 10% TBSA

- Apply a dry sterile burn sheet and maintain body temperature with blankets. Consider increasing the temperature in the patient compartment.
- NORMAL SALINE (WARMED NORMAL SALINE is preferred):
  - Adult:
    - 500mL IV/IO, regardless of the blood pressure
  - Pediatric:
    - Refer to the "Handtevy" system
    - 6 - 12 years old
      - 10mL/kg IV/IO, regardless of the blood pressure. Max total dose 250mL
    - < 5 years old
      - 5mL/kg IV/IO, regardless of the blood pressure. Max total dose 125mL

ELECTRICAL BURNS

- Treat associated burns as indicated above

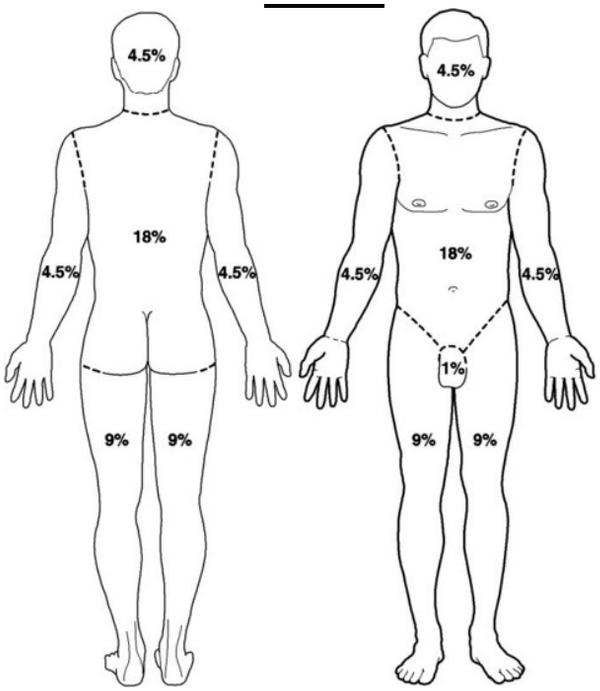
CHEMICAL BURNS

- Irrigate liquid chemical burns with copious amounts of water (sterile or tap). Brush off dry chemicals prior to irrigation.
- Remove patient's clothing and ensure that the patient is decontaminated prior to transport in order to avoid contaminating personnel and equipment. Personnel shall wear protective clothing and/or respiratory protection as needed when removing chemicals.

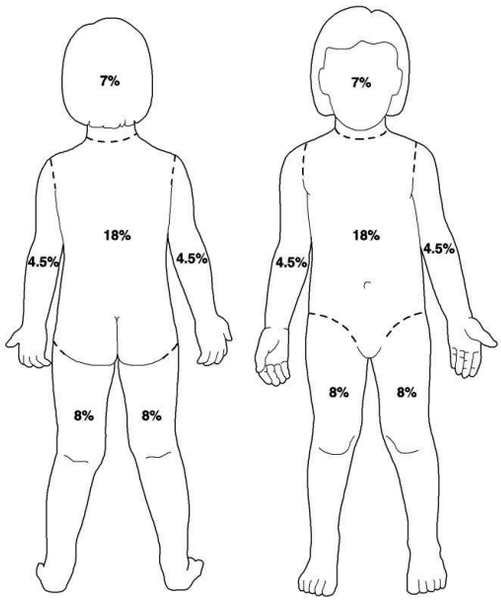
ADULT & PEDIATRIC

- Use the following charts to determine Total Body Surface Area (TBSA) percentage of the burn.

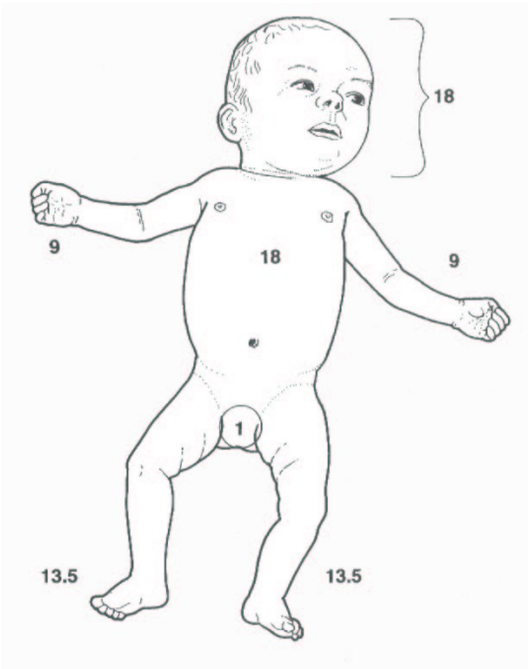
Adult



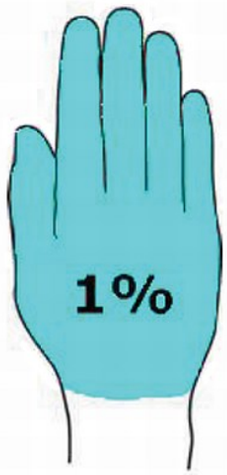
Child



Infant



The remaining 18% for an infant includes the posterior torso



Palm and fingers of **patient** = **1% TBSA**

Chest Trauma

ADULT & PEDIATRIC

WARNING
If the patient is intubated and there are absent lung sounds on the left side, suspect right mainstem intubation. Check the depth of the ETT PRIOR to any needle decompression or finger thoracostomy.

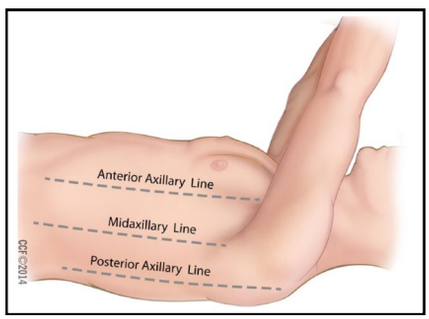
PENETRATING OBJECTS
- Stabilize with a bulky dressing

FLAIL CHEST
- Occurs when 2 or more adjacent ribs are fractured
- Stabilize with a bulky dressing

OPEN PNEUMOTHORAX (SUCKING CHEST WOUND)
- Occurs when air enters the pleural space, causing the lung to collapse
- Apply a vented chest seal or occlusive dressing to all open chest wounds and monitor for signs & symptoms of a tension pneumothorax
    - Apply on exhalation if possible

TENSION PNEUMOTHORAX/HEMOTHORAX
- Tension pneumothorax occurs when air continues to enter the pleural space without an exit or release, causing an increase in intrathoracic pressure.
- Tension hemothorax occurs when blood continues enter the pleural space without an exit or release, causing an increase in intrathoracic pressure.
    - Increased intrathoracic pressure decreases cardiac output and gas exchange, causing life threatening hypotension and hypoxia.

NEEDLE DECOMPRESSION
- Indications:
    - Traumatic Arrest (performed bilaterally) when finger thoracostomy is not immediately available.
    - When cardiac arrest is imminent with **ALL** of the following:
        - Respiratory distress or difficulty ventilating with a BVM
        - Decreased or absent breath sounds to the affected side
        - Decompensated shock (SBP < 90 mmHg) or age appropriate hypotension
- Primary site:
    - 4th or 5th intercostal space of the anterior axillary line
- Secondary site:
    - 2nd or 3rd intercostal space of the midclavicular line



FINGER THORACOSTOMY
- Indications:
    - Traumatic Arrest (performed bilaterally)
    - When cardiac arrest is imminent with **ALL** of the following:
        - Respiratory distress or difficulty ventilating with a BVM
        - Decreased or absent breath sounds to the affected side
        - Decompensated shock (SBP < 90 mmHg) or age appropriate hypotension
- Site:
    - 4th/5th intercostal space of the anterior axillary line
    - Perform only on indicated side(s) when arrest is imminent

SPECIAL CONSIDERATIONS
- If finger thoracostomy is performed, and a large volume of blood immediately is produced, **DO NOT** allow the blood to completely drain. Immediately cover the incision site with an occlusive dressing and continue resuscitation attempts.

Head Injuries

INFORMATION

- Patients with a decreased Level Of Consciousness (LOC) may be unable to protect their airway.
- Adequate oxygenation of the injured brain is critical to preventing secondary injury.
- Delayed Sequence Induction should be considered for patients who are unable to maintain a patent airway. Refer to the "Delayed Sequence Induction" protocol (pp. 59-61), as applicable.
- If patient becomes combative, refer to the "Behavioral Emergencies" protocol (pp. 111-113).
- **AVOID ALL OF THE FOLLOWING WITH HEAD INJURIES**
  - Hypoxia
    - Maintain SpO_2 of 90% or greater
  - Hypotension
    - Adult:
      - Maintain SBP between 120-130 mmHg, regardless of multi-system trauma
    - Pediatric:
      - Maintain age appropriate SBP within normal range. Refer to "Handtevy" system
  - Hyperventilation
    - Maintain $EtCO_2$ of 35-45 mmHg

WARNING
A single instance of hypotension or hypoxia (SpO_2 < 90%) in patients with a brain injury may increase the mortality rate by 150%.

ADULT & PEDIATRIC

ALL HEAD INJURIES

- OXYGEN:
  - 15 LPM via NRB, regardless of SpO_2, unless the patient requires ventilatory support
- NORMAL SALINE:
  - Adult: **(only enough to maintain SBP of 120-130 mmHg)**
    - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
    - May repeat 1x prn
    - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients
  - Pediatric: **(only enough to maintain an age appropriate SBP within normal range. Refer to "Handtevy" system)**
    - 20mL/kg IV/IO. Assess lung sounds and BP frequently
    - May repeat 2x prn for age appropriate hypotension
    - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

HEAD INJURIES WITH HYPOTENSION NOT RESPONDING TO ABOVE TREATMENT REGARDLESS OF MULTI-SYSTEM TRAUMA OR HEMORRHAGIC SHOCK

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain SBP 120 - 130 mmHg. Max total dose 300mcg (30mL)
  - Precautions:
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration

HEAD INJURIES WITH NEW ONSET GCS ≤ 12

- GCS of ≤ 12 must be assessed prior to any sedation medication administration
- TRANEXAMIC ACID (TXA) INFUSION:
  - Adult:
    - **Dilute**: 2g of TXA in a 50mL bag of NORMAL SALINE
    - Administer IV/IO by utilizing a 60 gtt set, run wide open
  - Pediatric: (5 years old to signs of puberty)
    - **Dilute**: 15mg/kg of TXA in a 50mL bag of NORMAL SALINE. Max single dose 1g
    - Administer IV/IO by utilizing a 60 gtt set, run wide open
  - Contraindications:
    - Time of injury > 3 hours
    - Gastrointestinal (GI) Bleed

DEPRESSED OR OPEN SKULL FRACTURE

- Pressure dressings should not be applied to depressed or open skull fractures unless there is significant hemorrhage present, as this can cause an increase in Intracranial Pressure (ICP)

Glasgow Coma Scale		Score
Eye Opening	Spontaneously	**4**
	To Speech	**3**
	To Pain	**2**
	None	**1**
Verbal Response	Orientated	**5**
	Confused	**4**
	Inappropriate	**3**
	Incomprehensible	**2**
	None	**1**
Motor Response	Obeys Commands	**6**
	Localizes to Pain	**5**
	Withdraws from Pain	**4**
	Flexion to Pain	**3**
	Extension to Pain	**2**
	None	**1**
Maximum Score		**15**

Open Fractures

INFORMATION

- An open fracture is a broken bone with extensive tissue damage, gross contamination, and/or visible bone.

ADULT & PEDIATRIC

- Assess neurovascular status of extremity
  - Color, temperature, capillary refill, crepitus
  - Place SpO_2 probe distal to injury to assess circulation utilizing pleth waveform
- Gross contamination, such as leaves or gravel, should be removed if possible
- Cover open fractures with a moist sterile dressing
- Fractures should be splinted in the position found
  - **Exception**: No pulse present **OR** the patient cannot be transported due to the extremity's unusual position
    - 2 attempts can be made to place the injured extremity in a normal anatomical position
    - Discontinue attempts if the patient complains of severe pain or if there is resistance to movement felt
    - Reassess neurovascular status before and after repositioning of patient's extremity
- CEFTRIAXONE INFUSION (ROCEPHIN):
  - Reconstitute 2g of CEFTRIAXONE using 20mL of NORMAL SALINE in the medication vial
  - Adult:
    - **Dilute**: 2g of CEFTRIAXONE in a 50mL bag of NORMAL SALINE
    - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)
  - Pediatric:
    - **Dilute**: 50mg/kg of CEFTRIAXONE in a 50mL bag of NORMAL SALINE
    - Administer over 10 minutes IV/IO by utilizing a 15 gtt set delivering 75 gtts/min (1.25 gtts/sec)
  - Contraindications:
    - Allergy to Cephalosporin antibiotics (e.g., Ancef, Ceclor, Cefdinir, Keflex)
    - Neonates

Unstable Pelvic Fractures

INFORMATION

- Unstable pelvic fracture:
  - Defined as 2 or more breaks in the bones of the pelvic ring
  - Most often caused by high impact events (e.g., MVC, fall from height, vehicle vs pedestrian)
  - May lead to extensive internal bleeding
- A fall from a standing position most likely will **NOT** result in an unstable pelvic fracture.

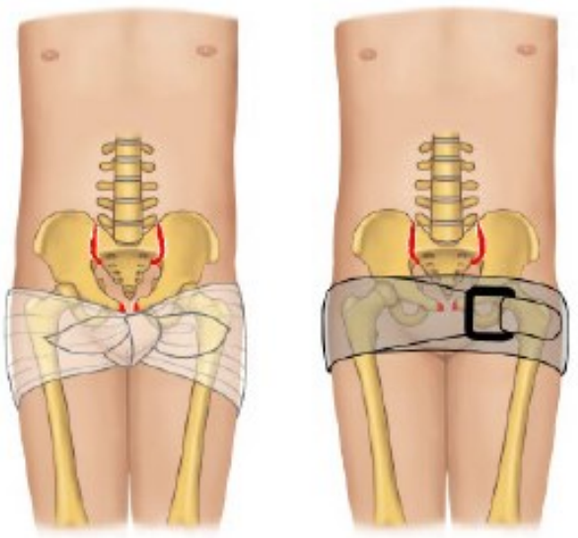
ADULT & PEDIATRIC

- Assess the pelvis by applying gentle pressure from the sides, then apply gentle pressure anterior to posterior to identify crepitus or instability.
  - If crepitus or instability is identified at anytime, **DO NOT** continue assessment
- Assess lower extremities for rotation or length discrepancy
- Visually assess perineum, genitalia, and rectum for bleeding
- Assess for signs and symptoms of shock
  - Refer to the "Traumatic Hemorrhagic Shock" protocol (p. 141)

SUSPECTED UNSTABLE PELVIC FRACTURE

- A combi-board should be used whenever possible to move a patient with a suspected unstable pelvic fracture
- Keep the patient on the combi-board throughout transport
- Apply mechanical stabilization with pelvic binder to all unstable pelvic fractures
  - If pelvic binder is too large or too small, utilize a sheet to apply circumferential pelvic compression at the level of the greater trochanter
  - Maintain compression throughout transport to ED
  - **DO NOT** use pelvic binder with an isolated hip fracture **WITHOUT** significant MOI
- Reassess neurovascular status before and after moving the patient

Greater Trochanter →



Traumatic Hemorrhagic Shock

INFORMATION

- Shock is defined as inadequate perfusion of blood and oxygen to the brain, heart, and other vital organs and tissues.
- A patient taking blood thinners or anticoagulants (e.g., Coumadin, Plavix, Pradaxa, Xarelto, Eliquis) has an increased potential for hemorrhagic shock.

ADULT & PEDIATRIC

- Control all major external bleeding
- Patient's body temperature shall be maintained with blankets
    - Consider increasing the temperature in the patient compartment
- Establish bilateral vascular access, utilizing largest catheter size possible

IF PATIENT MEETS WHOLE BLOOD TRANSFUSION/TXA CRITERIA

- EMS Captain shall be contacted
- Refer to the "Whole Blood Transfusion/TXA" protocol (pp. 129-130) for WHOLE BLOOD and TRANEXAMIC ACID (TXA) administration procedure
    - Administer TRANEXAMIC ACID (TXA) with or without WHOLE BLOOD

PATIENT MEETS WHOLE BLOOD TRANSFUSION/TXA CRITERIA AND WHOLE BLOOD/TXA IS NOT AVAILABLE

- NORMAL SALINE should **ONLY** be given when WHOLE BLOOD/TXA is not available
- NORMAL SALINE (WARMED NORMAL SALINE is preferred):
    - IV fluids should be given at a rate (boluses) necessary to maintain peripheral pulses (which is typically a SBP of 80-90 mmHg)

Consideration to WHOLE BLOOD administration should be given to patients who are prescribed Beta Blockers and/or Calcium Channel Blockers with a HR < 110 beats per minute.

Neurogenic Shock

INFORMATION

- Signs & Symptoms:
  - Warm/Dry skin (especially below the area of the injury)
  - Hypotension with a heart rate within normal limits
  - Paralysis

ADULT

- Maintain body temperature with blankets and consider increasing the temperature in the patient compartment
- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

PATIENT REMAINS HYPOTENSIVE

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain SBP 100mmHg. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration

PEDIATRIC

- Maintain body temperature with blankets and consider increasing the temperature in the patient compartment
- NORMAL SALINE:
  - 20mL/kg IV/IO. Assess lung sounds and BP frequently
  - May repeat 2x prn, for age appropriate hypotension
  - Precaution - Particular care must be taken in the presence of CHF and renal failure patients

PATIENT REMAINS HYPOTENSIVE

- PUSH-DOSE PRESSOR EPINEPHRINE (1:100,000):
  - **Dilute**: Refer to "Medication Dilution Instructions" (p. 12)
    - Administer 1mL/minute IV/IO
    - Titrate to maintain age appropriate SBP. Max total dose 300mcg (30mL)
  - Contraindication - Hypotension secondary to blood loss
  - Precautions:
    - **DO NOT** administer faster than 1mL/minute
    - Rapid (< 2 minutes) onset, short (5-10 minute) duration
    - Monitor heart rate and blood pressure throughout administration

INFORMATION

PHYSIOLOGICAL CHANGES DURING PREGNANCY

- Due to the following physiological changes in pregnancy, it is often difficult to assess for shock:
  - Mother's heart rate increases
    - By the 3rd trimester, the HR can be 15-20 beats per minute above normal
  - Both the systolic and diastolic blood pressures drop 5-15 mmHg during the second trimester
  - The mother's cardiac output and blood volume increases
    - Therefore, the pregnant patient may lose 30-35% of her blood volume before the signs & symptoms of shock become apparent
  - Supine hypotension usually occurs in the 3rd trimester

ADULT

- Assess for vaginal bleeding and a rigid abdomen
  - In the third trimester, this could indicate an abruptio placenta or a ruptured uterus
- POSITIONING:
  - Pregnant patients not requiring spinal motion restriction shall be transported on their left side
  - If a pregnant patient requires spinal motion restriction, place 4-6 inches of padding under the patient's right side while maintaining normal anatomical alignment

ALL THIRD TRIMESTER PREGNANCY TRAUMA PATIENTS

- OXYGEN
  - 15 LPM via NRB, regardless of SpO_2, unless the patient requires ventilatory support

IF PATIENT MEETS WHOLE BLOOD TRANSFUSION/TXA CRITERIA

- EMS Captain shall be contacted
- Refer to the "Whole Blood Transfusion/TXA" protocol (pp. 129-130) for WHOLE BLOOD and TRANEXAMIC ACID (TXA) administration procedure
  - Administer TRANEXAMIC ACID (TXA) with or without WHOLE BLOOD

PATIENT MEETS WHOLE BLOOD TRANSFUSION/TXA CRITERIA AND WHOLE BLOOD/TXA IS NOT AVAILABLE

- NORMAL SALINE should **ONLY** be given when WHOLE BLOOD/TXA is not available
- NORMAL SALINE (WARMED NORMAL SALINE is preferred):
  - IV fluids should be given at a rate (boluses) necessary to maintain peripheral pulses (which is typically a SBP of 80-90 mmHg)

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Obstetrical Emergencies

Standing Orders (p. 147)

1st & 2nd Trimester Complications (p.148)

3rd Trimester Complications (p. 149)

Pre-Eclampsia/Eclampsia (p. 150)

Hemorrhagic Shock in Pregnancy (p. 151)

Normal Delivery (p. 152)

Delivery Complications (pp. 153-154)

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INFORMATION

- Obstetrical patients are defined as gestation > 20 weeks.

PHYSIOLOGICAL CHANGES DURING PREGNANCY

- Mother's heart rate increases
  - By the 3rd trimester, the HR can be 15-20 beats per minute above normal
- Both the systolic and diastolic blood pressures drop 5-15 mmHg during the 2nd trimester
- The mother's cardiac output and blood volume increases
  - Therefore, the pregnant patient may lose 30-35% of her blood volume before the signs & symptoms of shock become apparent
- Supine hypotension usually occurs in the 3rd trimester

ADULT

- POSITIONING:
  - Transport patients in their third trimester and not in active labor on their left side

WATER HAS BROKE

- Document:
  - Time
  - Color of fluid

BLOOD PRESENT

- Document:
  - Time
  - Volume

CROWNING

- Prepare for a field delivery
- **DO NOT** delay transport to the closest appropriate hospital

FOCUSED HISTORY

- Obtain:
  - Gestational age of fetus
  - Due date
  - Number of previous pregnancies (GRAVIDA)
  - Number of previous viable births (PARA)
    - Natural delivery and/or cesarean section
  - Number of previous abortions
    - Spontaneous and/or elective abortions
  - Documented multiple births
  - Gestational Diabetes
  - Substance abuse
  - Frequency and length of contractions
  - Feeling of having to push or have a bowel movement

1st & 2nd Trimester Complications

INFORMATION

1st TRIMESTER

- Weeks 1 - 12 of the pregnancy

2nd TRIMESTER

- Weeks 13 - 27 of the pregnancy

ECTOPIC PREGNANCY (usually first trimester)

- Signs & Symptoms:
  - Sudden onset of severe lower abdominal pain
  - Vaginal bleeding
  - Amenorrhea (absence of menstruation)
  - Referred pain to the left shoulder
  - Cullen's sign (periumbilical ecchymosis)
  - Grey Turner's sign (ecchymosis of the flanks)
  - Abdominal distention and tenderness

SPONTANEOUS ABORTION (usually before 20 weeks of gestation)

- Signs & Symptoms:
  - Abdominal cramping
  - Vaginal bleeding
  - Passage of tissue or fetus

ADULT

- Assess and treat for shock
- Rapidly transport to any approved OB facility

ACTIVE BLEEDING

- Loosely place trauma pads over the vagina in an effort to stop the flow of blood
- **DO NOT** pack the vagina

HYPOTENSION NOT SECONDARY TO BLOOD LOSS

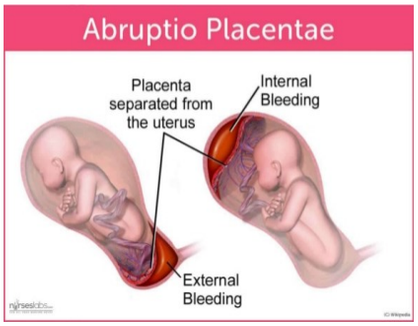
- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

HYPOTENSION SECONDARY TO BLOOD LOSS

- Refer to the "Hemorrhagic Shock in pregnancy" protocol (p. 151)

3rd Trimester Complications

INFORMATION



THIRD TRIMESTER

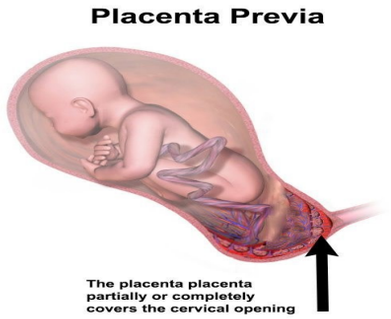
- Weeks 28 - delivery

PLACENTA ABRUPTIO

- Signs & Symptoms:
  - Sudden onset of severe abdominal pain and tenderness
  - Painful uterine contractions
  - Vaginal bleeding with dark red blood
  - Patient may present in shock

PLACENTA PREVIA

- Signs & Symptoms:
  - Painless vaginal bleeding (bright red blood)



UTERINE RUPTURE

- Signs & Symptoms:
  - Sudden, intense abdominal pain
  - Vaginal bleeding

ADULT

- Assess and treat for shock
- If in cardiac arrest, refer to the "Cardiac Arrest Special Considerations" protocol (pp. 95-97)
- POSITIONING:
  - During transport, place 4-6 inches of padding under the patient's right side while maintaining normal anatomical alignment

ACTIVE BLEEDING

- Loosely place trauma pads over the vagina in an effort to stop the flow of blood
- **DO NOT** pack the vagina

HYPOTENSION NOT SECONDARY TO BLOOD LOSS

- NORMAL SALINE:
  - 1L IV/IO, titrate to desired effect. Assess lung sounds and BP frequently.
  - May repeat 1x prn
  - Precaution - Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

HYPOTENSION SECONDARY TO BLOOD LOSS

- Refer to the "Hemorrhagic Shock in pregnancy" protocol (p. 151)

Pre-Eclampsia/Eclampsia

INFORMATION

- Either condition can occur for up to 6 weeks postpartum.

SEVERE PRE-ECLAMPSIA

- A rare pregnancy complication characterized by high blood pressure that usually begins after 20 weeks of pregnancy.
- Signs & Symptoms:
  - HTN (Systolic > 160 mmHg **OR** a Diastolic > 110 mmHg) **WITH** any of the following:
    - Right upper abdominal pain
    - Visual disturbances
    - Headache
    - Pulmonary edema

ECLAMPSIA

- Signs & Symptoms:
  - Any of the severe pre-eclampsia signs & symptoms associated with:
    - AMS **OR** Seizures **OR** Coma

ADULT

- OBTAIN A BGL

SEVERE PRE-ECLAMPSIA (NOT IN ACTIVE LABOR)

- MAGNESIUM SULFATE INFUSION:
  - **Dilute**: 4g of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension

ECLAMPSIA

- MAGNESIUM SULFATE INFUSION:
  - **Dilute**: 4g of MAGNESIUM SULFATE in a 50mL bag of NORMAL SALINE
    - Administer IV/IO utilizing a 60 gtt set, run wide open
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension
- VERSED (IF ACTIVELY SEIZING **AND** MAGNESIUM SULFATE HAS BEEN ADMINISTERED):
  - 5mg IV/IO/IN/IM
  - May repeat 1x prn, in 5 minutes if seizure reoccurs or does not subside
  - Contraindication - Hypotension
  - Precaution - Monitor for respiratory depression

UNABLE TO ESTABLISH VASCULAR ACCESS

- MAGNESIUM SULFATE:
  - 4g IM (8mL total)
  - 4mL maximum per site. This will require 2 injection sites
  - Contraindication - 2nd or 3rd Degree Heart Blocks
  - Precaution - Rapid infusion may cause hypotension
- VERSED (IF ACTIVELY SEIZING **AND** MAGNESIUM SULFATE HAS BEEN ADMINISTERED):
  - 5mg IN/IM
  - May repeat 1x prn, in 5 minutes if seizure reoccurs or does not subside
  - Contraindication - Hypotension
  - Precaution - Monitor for respiratory depression

Hemorrhagic Shock in Pregnancy

INFORMATION

- In the event a pregnant patient is hemorrhaging, every attempt to control the hemorrhaging should be made.
- Hypotension secondary to hemorrhage is a late finding in pregnant patients and occurs only after considerable blood loss has occurred.
- Acute postpartum hemorrhage is the leading worldwide cause of maternal mortality, such deaths being usually related to the development of hemorrhagic shock.

ADULT

- If the patient is hemorrhaging secondary to trauma, refer to the "Trauma in Pregnancy" protocol (p. 143)
- If in cardiac arrest, refer to the "Cardiac Arrest Special Considerations" protocol (pp. 95-97)
- POSITIONING:
  - During transport, place 4-6 inches of padding under the patient's right side while maintaining normal anatomical alignment
- OXYGEN:
  - 15 LPM via NRB, regardless of SpO_2, unless the patient requires ventilatory support

ACTIVE VAGINAL BLEEDING

- Loosely place trauma pads over the vagina in an effort to stop the flow of blood
- **DO NOT** pack the vagina
- If bleeding is secondary to postpartum hemorrhage:
  - Apply firm, continuous pressure, manually massaging the uterine fundus only after the placenta delivers

HEMORRHAGIC SHOCK SECONDARY TO COMPLICATIONS OF PREGNANCY

- Any patient with evidence/suspicion of massive hemorrhage **AND** one of the following:
  - Systolic Blood Pressure (SBP) < 70 mmHg
  - Systolic Blood Pressure (SBP) < 90 mmHg **AND** Heart Rate (HR) ≥ 110 beats per minute
  - EMS Captain/Flight Crew discretion
- TRANEXAMIC ACID (TXA) INFUSION:
  - **Dilute**: 2g of TXA in a 50mL bag of NORMAL SALINE
  - Administer IV/IO by utilizing a 60 gtt set, run wide open
  - Contraindications:
    - Onset of hemorrhage > 3 hours
    - Gastrointestinal (GI) Bleed
- NORMAL SALINE (WARMED NORMAL SALINE is preferred):
  - IV fluids should be given at a rate (boluses) necessary to maintain peripheral pulses (which is typically a SBP of 80-90 mmHg)

IF NO RESPONSE TO THE ABOVE TREATMENT

- EMS Captain shall be contacted
- Refer to the "Whole Blood Transfusion/TXA" protocol (pp. 129-130) for WHOLE BLOOD administration procedure

ADULT

NORMAL DELIVERY

- POSITIONING:
  - Place patient supine with knees flexed and feet flat on the floor
- Control delivery of the head, with gentle perineal pressure
- **DO NOT** apply manual pressure to the uterine fundus prior to the birth of the child
- **DO NOT** pull or push on the neonate
- **DO NOT** allow sudden hyperextension of the neonate's head
- Once the head delivers:
  - Suction the mouth and then the nose
  - Support the neonate's head as it rotates to align with the shoulders, gently guide the neonate's head downward to deliver the anterior shoulder
  - Once the anterior shoulder delivers, gently guide the neonate's head upward to deliver the posterior shoulder and the rest of the body

UPON DELIVERY OF THE NEONATE

- Dry, warm, and stimulate the neonate
- Keep the neonate at the same level of the placenta
- Once the umbilical cord stops pulsating (usually 3-5 minutes):
  - Clamp the cord in the following fashion:
    - Place the first clamp 4" away from the neonate's body
    - Milk the cord away from the neonate and towards the mother (this will minimize splatter)
    - Place the second clamp 2" away from the first, towards the mother
    - Cut the cord between the 2 clamps
- Place the neonate on the mother's chest, skin-to-skin, and cover with a dry blanket
- Record and encode an APGAR score at 1 and 5 minutes and document the delivery time
- Apply firm, continuous pressure, manually massaging the uterine fundus after the placenta delivers
- Preserve the placenta in the bag provided with the OB Kit or a "Red Bio-Hazard bag" for inspection by the receiving hospital

APGAR SCORE

Perform at 1 and 5 minutes after birth

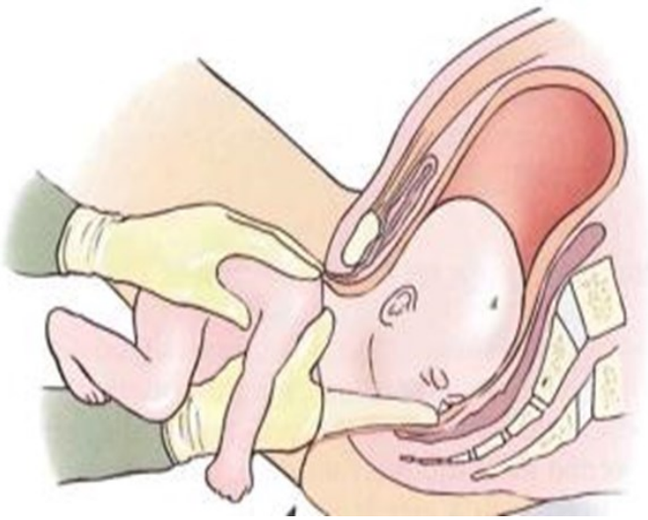
CRITERIA	SCORES		
	0	1	2
Activity (muscle tone)	*No movement* 	*Some movement* 	*Active movement* 
Pulse	*No Pulse*	*Less than 100 bpm*	*Greater than 100 bpm*
Grimace (reflex, irritability)	*No response to stimulation* 	*Grimace or feeble cry w/stimulation* 	*Active motion w/stimulation* 
Appearance (skin color)	*Blue all over* 	*Body pink, extremities blue* 	*Completely pink* 
Respiration	*No Breathing*	*Slow, irregular breathing*	*Strong Cry*

APGAR SCORE INTERPRETATION:	
0-3	**Severely Depressed:** Major Resuscitation Needed
4-6	**Moderately Depressed:** Moderate Resuscitation Needed
7-10	**Excellent Condition:** Minimal/No Resuscitation Needed

ADULT

BREECH BIRTH (FEET OR BUTTOCKS PRESENTATION)

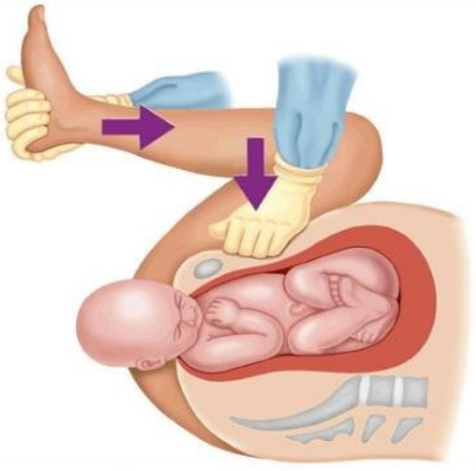
- If the head does not deliver within 3 minutes of the body:
  - Elevate the mother's hips (knee to chest position)
  - Insert a gloved hand into the vagina
  - Push the vaginal wall away from the neonate's nose and mouth
- Expedite transport while maintaining the knee to chest position and the neonate's airway
- OXYGEN
  - Administer blow-by OXYGEN to the neonate



SHOULDER DYSTOCIA (DIFFICULTY IN DELIVERING THE SHOULDERS)

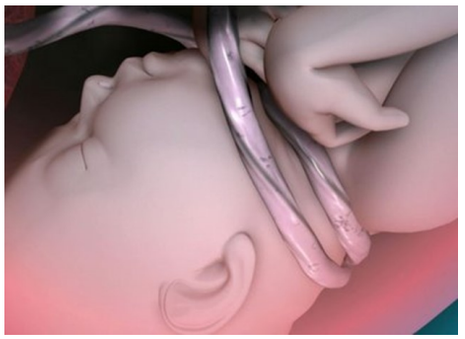
MCROBERT'S PROCEDURE:

- Hyperflex the mother's legs tightly to her abdomen
- It may be necessary to apply suprapubic pressure (mother's lower abdomen)
- Gently pull on the neonate's head



NUCHAL CORD

- Check for the presence of a nuchal cord after delivery of the head
- If the cord is around the neck:
  - Gently hook your finger under the loop
  - Pull it over the neonate's head
  - You may have to repeat this if there is more than 1 loop present
- If you are unable to free the cord:
  - Clamp the cord in 2 places
    - Cut the cord between the clamps



PROLAPSED UMBILICAL CORD

- POSITIONING:
  - Place mother in the knee to chest position
- Manually displace the uterus to the left
- Insert a gloved hand into the vagina
  - Push the neonate up and away from the umbilical cord regardless if there is a pulse present or not
  - Maintain this position during transport
- Frequently reassess the umbilical cord for the presence of a pulse, as contractions are likely to compress the umbilical cord
- Wrap the exposed cord in a moist sterile dressing
- Expedite transport to closest OB facility

Manual displacement of the uterus

NON-VIABLE FETUS DELIVERY (< 20 weeks of gestation)

- < 20 weeks:
  - Fetus shall be transported with the mother to the appropriate ED
  - An additional ePCR is **NOT** required for the non-viable fetus

MECONIUM STAINING

- Meconium will appear as a yellow to dark green substance, that may be noted in the amniotic fluid, coming from the vagina or covering the neonate's head.
- If upon delivery of the head there is meconium staining present:
  - Use a bulb syringe to clear secretions from the mouth and then nose before delivery of the shoulders
  - Meconium aspirators are rarely needed. However, consideration for usage may be given in a patient whose airway is obstructed by meconium that cannot be cleared by simpler methods

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PHARMACOLOGY

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This document can be utilized as an additional resource to the Palm Beach County Fire Rescue Patient Care Protocols. However, all final treatment decisions shall be decided by the Palm Beach County Fire Rescue Patient Care Protocols.

VAUGHAN WILLIAMS CLASSIFICATION OF ANTIARRHYTHMIC DRUGS

- **CLASS IA:**
  - These drugs block cardiac sodium channels and depress phase 0 of the action potential.
- **CLASS IB:**
  - These drugs block cardiac sodium channels and shorten the action potential.
- **CLASS IC:**
  - These drugs block cardiac sodium channels and have no effect on the action potential.
- **CLASS II:**
  - These drugs are known as beta-blockers. They antagonize beta-receptors inhibiting the effect of the sympathetic nervous system resulting in decreased chronotropic (heart rate), inotropic (contractility), and dromotropic (conductivity) effects.
- **CLASS III:**
  - These drugs act by blocking cardiac potassium channels.
- **CLASS IV:**
  - These drugs are known as non-dihydropyridine calcium channel blockers and act by blocking cardiac calcium uptake. They are used to slow AV nodal conduction, decreasing heart rate. They have less of an effect on sinus node activity.
- **CLASS V:**
  - This classification is for drugs for whom the mechanism of action is unknown.

Vaughan Williams Classification Of Antiarrhythmic Drugs

General Action	Class	Prototype	ECG Effects
Sodium Channel Blockers	IA	Quinidine, Procainamide, Disopyramide	Widened QRS, Prolonged QT
	IB	Lidocaine, Phenytoin, Mexiletine	Widened QRS, Prolonged QT
	IC	Flencainide, Propafenone, Moricizine	Prolonged PR, Widened QRS
Beta-blockers	II	Propranolol, Acebutolol, Esmolol, Metoprolol	Prolonged PR, Bradycardias
Potassium Channel Blockers	III	Bretylium, Amiodarone	Prolonged QT
Calcium Channel Blockers	IV	Verapamil, Diltiazem	Prolonged PR, Bradycardias
Miscellaneous	V	Adenosine, Digoxin	Prolonged PR, Bradycardias

FDA PREGNANCY CATEGORIES

- **CATEGORY A:**
  - Adequate and well-controlled studies have failed to demonstrate a risk to the fetus in the first trimester of pregnancy (and there is no evidence of risk in later trimesters).
- **CATEGORY B:**
  - Animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant women.
- **CATEGORY C:**
  - Animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drugs in pregnant women despite potential risks.
- **CATEGORY D:**
  - There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the drugs in pregnant women despite potential risks.
- **CATEGORY X:**
  - Studies in animals or humans have demonstrated fetal abnormalities and/or there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and the risks involved in use of the drug in pregnant women clearly outweigh potential benefits.

Adenosine (Adenocard)

CLASSIFICATION
- Class V antiarrhythmic

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Slows conduction through the AV-node thereby restoring patients to a normal sinus rhythm.

MECHANISM OF ACTION
- Adenosine decreases conduction of the electrical impulse through the AV node and interrupts AV re-entry pathways in paroxysmal supraventricular tachycardia (PSVT). It can effectively terminate rapid supraventricular arrhythmias such as PSVT. Because of its rapid onset of action and very short half life, the administration of Adenosine is sometimes referred to as chemical cardioversion.

PHARMACOKINETICS
- **Onset:** 20-30 Seconds
- **Peak Effects:** 20-30 Seconds
- **Duration:** 30 Seconds
- **Half-Life:** 10 seconds

INDICATIONS
- Stable Supraventricular Tachycardia (AAOx4 with/without hypotension)

CONTRAINDICATIONS
- Heart Transplant
- Patients taking Tegretol (Carbamazepine)
- Patients with a history of 2nd or 3rd degree heart block (except in patients with a functioning artificial pacemaker)
- Sick Sinus Syndrome without cardiac pacemaker in place
- Active bronchospasm

SIDE EFFECTS
- Chest Pain
- Dizziness
- Dyspnea
- Headache
- Facial flushing
- Palpitations
- Transient asystole
- Nausea/Vomiting

Albuterol (Proventil, Ventolin)

CLASSIFICATION
- Sympathetic agonist

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Albuterol is a sympathomimetic that is selective for Beta-2 adrenergic receptors. It is also an adrenergic agonist that has an additive effect with insulin and glucose, which may in turn help shift potassium into the intercellular space. This can be very beneficial in patients with renal failure when fluid overload is a concern.

MECHANISM OF ACTION
- Causes prompt bronchodilation
- Aides in translocating potassium into the cell in the presence of hyperkalemia.

PHARMACOKINETICS
- **Onset:** 5-15 minutes
- **Peak Effects:** 1-1.5 hours
- **Duration:** 3-6 hours
- **Half-Life:** < 3 hours

INDICATIONS
- Bronchospasm secondary to:
  - Allergic Reaction
  - COPD
  - Asthma
- Hyperkalemia

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- Caution shall be used when administering Albuterol to elderly patients and those with cardiovascular disease or hypertension

SIDE EFFECTS
- Anxiety
- Dizziness
- Nausea/Vomiting
- Tachycardia
- Arrhythmias
- Palpitations
- Chest pain
- Paradoxical bronchospasm

Amiodarone (Cordarone)

CLASSIFICATION

- Class III antiarrhythmic drug, but possesses electrophysiological characteristics of all 4 Vaughan Williams classes

PREGNANCY CATEGORY

- Category D

DESCRIPTION

- Amiodarone is a potent antiarrhythmic agent and the first-line antiarrhythmic agent given during cardiac arrest because it has been clinically demonstrated to minimally improve the rate of ROSC and hospital admission in adults with refractory ventricular fibrillation and pulseless ventricular tachycardia.

MECHANISM OF ACTION

- Prolongs the action potential duration in all cardiac tissues. It affects sodium, potassium, and calcium channels and has α– and β-adrenergic blocking properties.

PHARMACOKINETICS

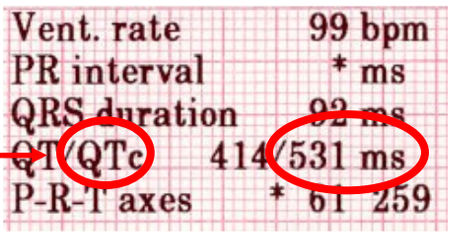
- **Onset:** 2-3 minutes
- **Peak Effects:** 3-7 hours
- **Duration:** Varies
- **Half-Life:** 40-55 days

INDICATIONS

- IVP: Ventricular Fibrillation and Pulseless Ventricular Tachycardia
- Infusion: Stable Wide Complex Tachycardia
- Infusion: If Unstable WCT converts after 2 cardioversion (if not already administered) and no contraindications are present
- Infusion: Upon ROSC if patient was in V-Fib/V-Tach and 2 shocks were delivered and no IVP Amiodarone was administered

CONTRAINDICATIONS

- Marked sinus bradycardia
- Adult: QRS width ≥ 0.20 (one large box)
- Pediatric: QRS width ≥ 0.16 (4 small boxes)
- Cardiogenic Shock
- QTc > 500
- 2nd or 3rd Degree Heart Blocks
- Hypotension



PRECAUTIONS

- Caution shall be used when administering to patients with latent or manifest heart failure because failure may be worsened with administration
- ECG shall be monitored. Be alert for hypotension, bradycardia, increased ventricular beats, prolonged PR intervals, QRS complexes, and QT intervals
- Patients shall also be monitored for signs of pulmonary toxicity such as dyspnea and cough

Aspirin

CLASSIFICATION
- Platelet aggregation inhibitor and anti-inflammatory agent

PREGNANCY CATEGORY
- Unassigned

DESCRIPTION
- Aspirin is an anti-inflammatory agent and an inhibitor of platelet function. This makes it a useful agent in the treatment of various thromboembolic diseases such as acute myocardial infarction.

MECHANISM OF ACTION
- Causes platelets to aggregate and arteries to constrict. This results in an overall reduction in mortality associated with myocardial infarction.

PHARMACOKINETICS
- **Onset:** 5-30 minutes
- **Peak Effects:** 15-120 minutes
- **Duration:** 1-4 hours
- **Half-Life:** 15-20 minutes

INDICATIONS
- Ischemic chest pain
- STEMI Alert with or without chest pain

CONTRAINDICATIONS
- < 16 years old
- Active GI bleeding

PRECAUTIONS
- Unless the patient has taken 324mg within 24 hours, administer full dose
- Aspirin shall be used with caution in patients who report allergies to the non-steroidal anti-inflammatory (NSAID) class of medications.

SIDE EFFECTS
- Anaphylaxis
- Gastrointestinal bleeding
- Tinnitus
- Nausea/ Vomiting
- Heartburn
- Wheezing
- Prolonged bleeding

Atropine Sulfate

CLASSIFICATION
- Parasympatholytic (Anticholinergic)

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Atropine Sulfate is a potent parasympatholytic (anticholinergic) and is used to increase the heart rate in hemodynamically significant bradycardias and plays an important role as an antidote in organophosphate poisonings.

MECHANISM OF ACTION
- Atropine is a parasympatholytic (anticholinergic) that acts to block acetylcholine receptors, thus inhibiting parasympathetic stimulation. Although it has positive chronotropic properties, it has little or no inotropic effect.
- Blocks acetylcholine, increases heart rate, decreases gastrointestinal secretions.

PHARMACOKINETICS
- **Onset:** Immediate
- **Peak Effects:** 2-4 minutes
- **Duration:** 4 hours
- **Half-Life:** 2-3 hours

INDICATIONS
- Unstable Bradycardia
- Hypersalivation reaction to Ketamine administration
- Organophosphate poisoning

CONTRAINDICATIONS
- Bradycardia in the presence of an MI

PRECAUTIONS
- Atropine shall be used cautiously in the presence of coronary artery disease as the increased heart rate may worsen ischemia
- Atropine may actually worsen the bradycardia associated with second-degree Mobitz II and third-degree AV blocks.

SIDE EFFECTS
- Blurred Vision/Dizziness
- Dilated Pupils
- Dry Mucus Membranes
- Palpitations
- Reflex Bradycardia
- Tachycardia
- Drowsiness/Confusion

Calcium Chloride

CLASSIFICATION
- Calcium supplement

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Calcium Chloride provides elemental calcium in the form of the cation (Ca^{2+}). Calcium is required for many physiological activities.

MECHANISM OF ACTION
- In the myocardium, it increases the force of contraction and augments cardiac output. Calcium also has a stabilizing effect on myocardial membranes when dangerously high potassium levels make the heart at risk for fibrillation.

PHARMACOKINETICS
- **Onset:** Immediate
- **Peak Effects:** Unknown
- **Duration:** Varies
- **Half-Life:** Not applicable

INDICATIONS
- Calcium channel blocker overdose with isolated hypotension
- Hyperkalemia
- Cardizem induced hypotension
- Really Wide Complex Tachycardia (RWCT)

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- **DO NOT** administer in same IV/IO line as Sodium Bicarbonate without thoroughly flushing the line

SIDE EFFECTS
- Bradycardia
- Arrhythmias-especially in patients on Digoxin
- Heart block
- Asystole
- Tissue necrosis
- Syncope
- Nausea/Vomiting
- Cardiac Arrest

Cyanokit (Hydroxocobalamin)

CLASSIFICATION
- Cyanide antidote

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Hydroxocobalamin is a cyanide antidote that is a chemical precursor to cyanocobalamin.

MECHANISM OF ACTION
- Hydroxocobalamin chelates the cyanide ion from cytochrome oxidase (the terminal enzyme in the electron transport chain). Each hydroxocobalamin molecule can bind one molecule of cyanide. The resultant compound cyanocobalamin is cleared in urine.

PHARMACOKINETICS
- **Onset:** 2-15 minutes
- **Peak Effects:** Varies
- **Duration:** Varies
- **Half-Life:** 26-31 hours

INDICATIONS
- Known or suspected cyanide poisoning
- Any firefighter who suffers cardiac arrest during or within 6 hours after a fire incident, shall be treated for a Cyanide Exposure.

CONTRAINDICATIONS
- None when used in the treatment of cyanide poisoning

SIDE EFFECTS
- Chromaturia (red-colored urine)
- Red Skin
- Rash
- Hypertension
- Nausea
- Headache

Dextrose 10% (D10)

CLASSIFICATION
- Hypertonic dextrose-containing solution (Carbohydrate)

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- D10 is a hypertonic solution. The amount of carbohydrate contained within D10 makes it of use in the management of hypoglycemia.

MECHANISM OF ACTION
- Dextrose supplies supplemental glucose in cases of hypoglycemia. Serious brain injury can occur if hypoglycemia is prolonged. Thus, in hypoglycemia the rapid administration of glucose is essential.

PHARMACOKINETICS
- **Onset:** < 1 minute
- **Peak Effects:** Varies
- **Duration:** Varies
- **Half-Life:** Not applicable

INDICATIONS
- Hypoglycemia

CONTRAINDICATIONS
- None in the emergency setting

SIDE EFFECTS
- Hyperglycemia
- Thrombophlebitis

Diltiazem (Cardizem)

CLASSIFICATION
- Calcium channel blocker (Class IV antiarrhythmic)

PREGNANCY CATEGORY
- Category C

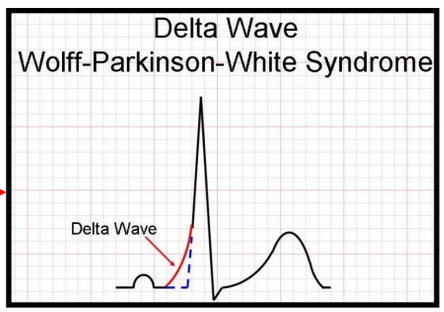
DESCRIPTION
- Cardizem is a calcium-ion antagonist (calcium channel blocker). It causes a relaxation of vascular smooth muscle and slows conduction through the AV node.

MECHANISM OF ACTION
- Cardizem causes vascular dilation and slows conduction through the AV node. It slows the rapid ventricular rates associated with atrial fibrillation and atrial flutter. It also works well for treating SVT with minimal side effects.

PHARMACOKINETICS
- **Onset:** 3 minutes
- **Peak Effects:** 7 minutes
- **Duration:** 1-3 hours
- **Half-Life:** 2 hours

INDICATIONS
- Atrial Fibrillation
- Atrial Flutter
- SVT when rhythm fails to convert after Adenosine administration/Adenosine is contraindicated or patient has history of atrial dysrhythmias

CONTRAINDICATIONS
- Hypotension
- Wide complex QRS
- History of WPW or sick sinus syndrome
- Heart Blocks



PRECAUTIONS
- Use with caution for patients taking beta blockers

SIDE EFFECTS
- Hypotension
- Bradycardia
- Headache
- Nausea/ Vomiting
- Torsades de Pointes

Diphenhydramine (Benadryl)

CLASSIFICATION
- Antihistamine

PREGNANCY CATEGORY
- Category B

DESCRIPTION
- H_1 receptor antagonist

MECHANISM OF ACTION
- Diphenhydramine is an H_1 receptor antagonist blocking histamine release. It is also a potent anticholinergic agent.

PHARMACOKINETICS
- **Onset:** 10-15 minutes
- **Peak Effects:** 1 hour
- **Duration:** 6-8 hours
- **Half-Life:** 1-4 hours

INDICATIONS
- Mild/Moderate/Severe Allergic Reactions
- Dystonic reactions

CONTRAINDICATIONS
- Neonates

PRECAUTIONS
- Use with caution in patients with asthma, narrow angle glaucoma, benign prostatic hypertrophy.

SIDE EFFECTS
- CNS Depression
- Palpitations
- Tachycardia
- Nausea/Vomiting
- Drowsiness/Fatigue

Droperidol

CLASSIFICATION
- Antipsychotic

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Droperidol is a neuroleptic, antipsychotic agent that acts on Alpha and Dopamine receptors, resulting in sedation.

MECHANISM OF ACTION
- Droperidol is a butyrophenone antipsychotic. Its antiemetic effect is a result of blockade of dopamine stimulation of the chemoreceptor trigger zone.
- Other effects include alpha-adrenergic blockade, peripheral vascular dilation, and reduction of the pressor effect of epinephrine resulting in hypotension and decreased peripheral vascular resistance; may also reduce pulmonary artery pressure.

PHARMACOKINETICS
- **Onset:** 5-15 minutes (IM & IV)
- **Peak Effects:** 30 minutes
- **Duration:** 2-4 hours
- **Half-Life:** 2 hours

INDICATIONS
- Behavioral Emergencies:
  - Adult:
    - Moderate and/or severe patients who are > 65 years old, have known coronary artery disease, have neuro-developmental disorders, have already taken other sedatives, or have any Ketamine contraindication
  - Pediatric:
    - Moderate or Severe

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- Use with caution for a patient that is already taking other sedatives (e.g., benzodiazepines, alcohol, etc.)

SIDE EFFECTS
- Hypertension
- Hypotension
- QTc prolongation
- Tachycardia
- Anxiety
- Drowsiness
- Dystonia
- Hallucinations
- Hyperactivity
- Laryngospasms
- Anaphylaxis
- Shivering
- Bronchospasms

Epinephrine (Adrenaline)

CLASSIFICATION
- Sympathomimetic agonist

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Epinephrine is a naturally occurring catecholamine with both α– and β-adrenergic stimulant effects

MECHANISM OF ACTION
- Epinephrine acts directly on α– and β-adrenergic receptors. Its effects on β-receptors is much more profound than its effects on α–receptors
- Stimulates all the effects of the sympathetic nervous system
- Increases heart rate, conductivity, and force of contraction of the heart
- Increases systemic vascular resistance and causes bronchodilation
- When given IV/IO, effects usually appear within 90 seconds of administration, and they are usually of short duration. Therefore, it must be administered every 5 minutes in Cardiac Arrest to maintain therapeutic levels.
- When using Epinephrine IV/IO as a push-dose pressor, the medication should be administered every minute, on the minute, and over a minute until the desired blood pressure is achieved.
- When given IM, the onset of effect is slower and the duration of effect is prolonged

PHARMACOKINETICS
- **Onset:** < 2 minutes
- **Peak Effects:** < 5 minutes (IV)
- **Duration:** 5-10 minutes
- **Half-Life:** 5 minutes

INDICATIONS
- Patients that remain hypotensive after fluid administration (1:100,000 IV/IO)
- Moderate Allergic Reaction (1:1,000 IM)
- Severe Allergic Reaction (1:100,000 IV/IO)
- Severe Asthma that fails to improve after Albuterol treatment (1:1,000 IM)
- Croup/Epiglottitis (1:1,000 Nebulized)
- Adult Bradycardia:
  - If patient remains hypotensive after Atropine and/or transcutaneous pacing (1:100,000 IV/IO)
- Pediatric Bradycardia:
  - If no response to oxygenation, ventilation, and chest compressions (1:100,000 IV/IO)
- Cardiogenic Shock (1:100,000 IV/IO)
- Non-Fatal Drowning:
  - Hypotensive with pulmonary edema (1:100,000 IV/IO)
- Asystole/Pulseless Electrical Activity (1:10,000 IV/IO)
- Head injuries with hypotension not responding to Normal Saline (1:100,000 IV/IO)

Epinephrine (Adrenaline)

CONTRAINDICATIONS

- Refractory V-Fib/V-Tach (1:10,000)
- Hypotension secondary to blood loss (1:100,000)
  Exception: Head Injuries

PRECAUTIONS

- Rapid (< 2 minute) onset, short (5-10 minute) duration (1:100,000)
- Monitor heart rate and blood pressure throughout administration (1:100,000)
- Do not administer faster than 1mL/minute (Pediatric 1:100,000)
- **DO NOT** administer within 5 minutes of Epi-Pen administration (1:1,000)
- Epinephrine can be deactivated by alkaline solutions such as Sodium Bicarbonate. Thus, it is essential that the IV line be adequately flushed between administration of Epinephrine and Sodium Bicarbonate.

SIDE EFFECTS

- Anxiety
- Chest pain
- Headache
- Palpitations
- Tachycardia
- Tremors
- Ventricular Ectopy
- Nausea/Vomiting

Esmolol (Brevibloc)

CLASSIFICATION
- Selective beta blocker - Class II antiarrhythmic

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Esmolol is a β_1 selective (cardioselective) β-blocker with a very short half life

MECHANISM OF ACTION
- Esmolol is a selective β_1-blocker.
- Rapid onset (< 5 minutes) and a short half life (9 minutes).
- Decreases heart rate and atrioventricular conduction.

PHARMACOKINETICS
- **Onset:** < 5 minutes
- **Peak Effects:** 10-20 minutes
- **Duration:** 10-30 minutes
- **Half-Life:** 2-9 minutes

INDICATIONS
- Refractory Ventricular Fibrillation/Ventricular Tachycardia

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- None in the emergency setting

Etomidate (Amidate)

CLASSIFICATION
- Sedative and Hypnotic

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Ultra-short acting, non-barbiturate, nonbenzodiazepine hypnotic. It does not have any analgesic properties.
- Used as an induction of general anesthesia and sedation for short procedures such as tracheal intubation and electrical therapy.
- Of the sedatives used in tracheal intubation, Etomidate has a large safety profile

MECHANISM OF ACTION
- Produces a rapid induction of anesthesia with minimal respiratory and cardiovascular effects. Unlike other types of sedatives/hypnotics, Etomidate does not cause histamine release.

PHARMACOKINETICS
- **Onset:** 10-20 seconds
- **Peak Effects:** < 1 minute
- **Duration:** 3-5 minutes
- **Half-Life:** 30-70 minutes

INDICATIONS
- Sedation for cardioversion/pacing
- Delayed Sequence Induction when Ketamine is contraindicated or unavailable

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- Etomidate puts septic patients at an increased risk of independently developing adrenal suppression, which has been associated with increased mortality.

SIDE EFFECTS
- Apnea
- Hyper-/hypoventilation
- Hyper-/hypotension
- Laryngospasm
- Nausea/ Vomiting
- Tachycardia/Bradycardia

Fentanyl (Sublimaze)

CLASSIFICATION
- Narcotic analgesic

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Fentanyl is a potent, narcotic analgesic with similar effects as Morphine
- Fentanyl is 50 to 100 times more potent then Morphine
- Fentanyl acts primarily on the opiate receptors in the brain

MECHANISM OF ACTION
- The principle actions of therapeutic value are analgesic and sedative. Fentanyl is a narcotic analgesic with a rapid onset and a short duration of action. Alterations in respiratory rate and alveolar ventilation, associated with narcotic analgesics, may last longer than the analgesic effect. Large doses may produce apnea. Fentanyl appears to have less emetic activity than other narcotic analgesics.

PHARMACOKINETICS
- **Onset:** Immediate
- **Peak Effects:** 3-5 minutes (IV)
- **Duration:** 30-60 minutes
- **Half-Life:** 6-8 hours

INDICATIONS
- Moderate to severe pain relief
- Post intubation sedation

CONTRAINDICATIONS
- < 6 months old
- Pregnancy near term (32 weeks or greater) or in active labor

PRECAUTIONS
- Use consideration for patients with history of opiate abuse or drug seeking behavior
- Monitor patient for respiratory depression
- Discontinue if patient becomes drowsy
- Can be reversed with Narcan if necessary

SIDE EFFECTS
- Respiratory depression
- Apnea
- Chest wall rigidity
- Bradycardia
- Increased ICP

Gentamicin (Garamycin)

CLASSIFICATION
- Aminoglycoside antibiotic

PREGNANCY CATEGORY
- Category D

DESCRIPTION
- Gentamicin is a sterile, non-pyrogenic solution of gentamicin sulfate in water

MECHANISM OF ACTION
- Gentamicin binds to the prokaryotic ribosome, inhibiting protein synthesis in susceptible bacteria. It is bactericidal in-vitro against Gram-positive and Gram-negative bacteria

PHARMACOKINETICS
- **Peak Effects:** 30-60 minutes
- **Half-Life:** 6-8 hours

INDICATIONS
- Sepsis Alert

CONTRAINDICATIONS
- Allergy to Aminoglycoside antibiotics (e.g., Paromycin, Tobramycin, Neomycin)

PRECAUTIONS
- None in the emergency setting

SIDE EFFECTS
- Pain/Irritation/redness at the injection site may occur
- Upset stomach
- Nausea
- Vomiting

Ketamine (Ketalar)

CLASSIFICATION
- Anesthetic agents and analgesic agent

PREGNANCY CATEGORY
- Unassigned

DESCRIPTION
- Ketamine is a phencyclidine derivative that is unique among sedatives, hypnotics, and analgesic agents
- Strong amnestic properties

MECHANISM OF ACTION
- Ketamine's mechanism of action involves being an antagonist for the NMDA receptors that are found in nerve cells. These receptors are involved in processing central nervous system input. Ketamine blocks this sensory input. This action is what accounts for most of the effects seen from Ketamine.
- Ketamine has actions on other receptors within the body, such as opioid receptors, and has effects on sodium and calcium ion movement across cell membranes. Both of these actions may be related to its effectiveness for pain relief.
- Ketamine is thought to cause a dissociation between the cortical and limbic system, resulting in a seemingly awake patient that is dissociated from the environment. It has powerful analgesic and sedative properties.

PHARMACOKINETICS
- **Onset:** < 1 minute (IV), < 5 minutes (IM)
- **Peak Effects:** Varies
- **Duration:** 10-15 minutes (IV), 20-30 minutes (IM)
- **Half-Life:** 1-2 hours

INDICATIONS
- Seizures not responding to Versed
- CPR induced consciousness
- Adults with severe behavioral emergencies
- Severe pain management (pain scale 7 or higher)
- Induction for Advanced Airway Procedures
- Post intubation sedation

CONTRAINDICATIONS
- Pregnant patients
- Penetrating eye injury
- Non-traumatic chest pain
- **Exception:** Pregnancy is the only contraindication for Delayed Sequence Intubation

PRECAUTIONS
- Be prepared for advanced airway management
- Rapid IV administration is associated with respiratory depression, apnea, and higher than usual increases in blood pressures
- May increase schizophrenic symptoms

SIDE EFFECTS
- Hallucinations
- Laryngospasm
- Nausea and vomiting
- Increased skeletal muscle tone
- Roving eye movements and nystagmus

Lidocaine (Xylocaine)

CLASSIFICATION
- Anesthetic, Class IB antiarrhythmic

PREGNANCY CATEGORY
- Category B

DESCRIPTION
- Lidocaine is an amide-type, local anesthetic

MECHANISM OF ACTION
- Local anesthetic that works by reducing sensation or pain in the area of the body where it is administered and does not affect other areas
- Reduces pain by blocking nerve impulses that send pain sensations to the brain
- Lidocaine starts working within 90 seconds and the effects last about 20 minutes

PHARMACOKINETICS
- **Onset:** < 3 minutes
- **Peak Effects:** 5-7 minutes
- **Duration:** 10-20 minutes
- **Half-Life:** 1.5 hours-2 hours

INDICATIONS
- EZ-IO for the conscious patient

CONTRAINDICATIONS
- 2nd or 3rd degree heart block
- Bradycardia with PVCs

SIDE EFFECTS
- Drowsiness
- Dizziness/Blurred vision
- Muscle twitching
- Seizures
- Widened QRS/ Prolonged QT

Magnesium Sulfate

CLASSIFICATION
- Class V antiarrhythmic, electrolyte, and anticonvulsant

PREGNANCY CATEGORY
- Category D

DESCRIPTION
- Magnesium Sulfate is a essential element in many of the biochemical processes that occur in the body
- An intracellular electrolyte that acts as a physiological calcium channel blocker and blocks neuromuscular transmission.
- A smooth muscle relaxant
- Acts as a central nervous system depressant effective in the management of seizures associated with eclampsia.

MECHANISM OF ACTION
- Magnesium is a salt that dissociates into the magnesium cation (Mg^{2+}) and the sulfate anion when administered.

PHARMACOKINETICS
- **Onset:** Immediate (IV), 1 hour (IM)
- **Peak Effects:** Varies
- **Duration:** 30-60 minutes
- **Half-Life:** Not applicable

INDICATIONS
- Severe Asthma not responding to Albuterol, Solu-Medrol, and CPAP
- Polymorphic Ventricular Tachycardia
- Pre-Eclampsia/Eclampsia
- Post Resuscitation Considerations Post Torsades if Magnesium Sulfate was not administered

CONTRAINDICATIONS
- 2^{nd} or 3^{rd} Degree Heart Block

PRECAUTIONS
- Rapid infusion may cause hypotension
- Calcium Chloride should be readily available as an antidote in case respiratory depression occurs

SIDE EFFECTS
- Respiratory depression
- Respiratory paralysis
- CNS depression
- Flushing of the skin, sweating, itching, and rash
- Arrhythmias
- Drowsiness
- Loss of deep tendon reflexes

Narcan (Naloxone)

CLASSIFICATION
- Narcotic antagonist

PREGNANCY CATEGORY
- IV/IM: Category B/C
- IN: Unassigned

DESCRIPTION
- Narcan is an effective, narcotic antagonist that has proved effective in the management and reversal of overdoses caused by narcotics or synthetic narcotic agents

MECHANISM OF ACTION
- Reverses the respiratory depression effects of narcotics
- Chemically similar to the narcotics, however it only has antagonistic properties
- Narcan competes for narcotic receptor sites in the brain, and displaces narcotic molecules from the opiate receptors

PHARMACOKINETICS
- **Onset:** < 2 minutes (IV/IO), 2-10 minutes (IM)
- **Peak Effects:** < 2 minutes (IV/IO), 2-10 minutes (IM)
- **Duration:** 20-120 minutes
- **Half-Life:** 60-90 minutes

INDICATIONS
- Reversal of respiratory depression secondary to a narcotic overdose
- Reverse rigid chest wall syndrome secondary to Fentanyl administration

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- Acute narcotic withdrawal syndrome may occur in patients with narcotic dependence (nausea, vomiting, sweating, tachycardia, hypertension, tremor, agitation, diarrhea, abdominal cramps, seizures). This includes newborn infants of mothers with known or suspected narcotic dependence.

SIDE EFFECTS
- Aspiration
- Non-cardiogenic pulmonary edema

Nitroglycerin (Nitrostat)

CLASSIFICATION

- Nitrate

PREGNANCY CATEGORY

- Category C

DESCRIPTION

- Nitroglycerin is a potent, smooth muscle relaxant used in the treatment of angina pectoris and pulmonary edema/CHF.

MECHANISM OF ACTION

- Nitroglycerin is a rapid, smooth muscle relaxant that reduces cardiac workload and dilates the coronary arteries. This results in increased coronary blood flow and improved perfusion of the ischemic myocardium. Pain relief following nitroglycerin administration usually occurs within 1-2 minutes and the therapeutic effects may last up to 30 minutes.
- Also causes vasodilation, which decreases preload; decreased preload leads to decreased ventricular filling, which leads to reduced oxygen demand

PHARMACOKINETICS

- **Onset:** Immediate (IV); 1-3 minutes (SL)
- **Peak Effects:** 1-2 minutes (IV); 5-10 minutes (SL)
- **Duration:** 3-5 minutes (IV); 20-30 minutes (SL)
- **Half-Life:** 3 minutes (IV); 1-4 minutes (SL)

INDICATIONS

- If chest pain/discomfort persists after maximum Fentanyl administration **OR** drug seeking behavior is suspected
- CHF/Pulmonary Edema (Sublingual & IV)

CONTRAINDICATIONS

- SBP < 90 mm Hg
- Heart Rate < 50 beats per minute
- For chest pain - HR less than 50 beats per minute or greater than 100 beats per minute
- EDD (Viagra and Levitra within 24 hours and Cialis within 48 hours)
- Right Ventricular Infarction (positive V4R)

PRECAUTIONS

- Should **NOT** be administered in the same IV with any other medications
- The vasodilation effects may be increased in the presence of other anti-hypertensive medications
- **DO NOT** administer Nitroglycerin to patients in Cardiogenic Shock
- **DO NOT** administer if patient is febrile or from a nursing home and pneumonia is suspected

SIDE EFFECTS

- Headache
- Dizziness
- Weakness
- Hypotension
- Nausea/Vomiting
- Tachycardia

Normal Saline (0.9% Sodium Chloride)

CLASSIFICATION

- Isotonic electrolyte

PREGNANCY CATEGORY

- Category C

DESCRIPTION

- The use of 0.9 percent Sodium Chloride, or Normal Saline (as it is often called), has several applications in emergency medicine. Normal Saline contains 154 mEq/L of sodium ions (Na^+) and approximately 154 mEq/L of chloride (Cl^-) ions. Because of the concentration of sodium is near that of blood, the solution is considered isotonic. Normal Saline is especially useful in heat stroke, heat exhaustion, and diabetic ketoacidosis.

MECHANISM OF ACTION

- Normal Saline replaces water and electrolytes

INDICATIONS

- Medication Administration/Dilution
- Hyperglycemia
- Fluid Resuscitation/Dehydration
- Hypotension
- Medical Hemorrhagic Shock (**Warm** Normal Saline) only if Whole Blood/TXA is not available
- Nausea/Vomiting
- Sepsis
- Stroke (500mL)
- Pediatric Bradycardia:
  - If no response to oxygenation, ventilation, and chest compressions
- STEMI Alert
  - Positive V4R with clear lung sounds
- LVAD Hypoperfusion (500mL)
- Consideration of termination of efforts (500mL)
- Behavioral Emergencies:
  - Rapid Cooling for Excited Delirium with a temperature > 103 degrees F (**Cold** Normal Saline)
- Decompression Sickness (500mL)
- Heat Emergencies:
  - Heat cramps and/or heat exhaustion
  - Heat Stroke with temperature > 103 degrees F/AMS/seizures/hypotension (**Cold** Normal Saline)
- Burns: (500mL)
  - 2^{nd} or 3^{rd} Degree Burns ≥ 10% TBSA (**Warm** Normal Saline)
- All Head Injuries
- Traumatic Hemorrhagic Shock (**Warm** Normal Saline) only if Whole Blood/TXA is not available
- Neurogenic Shock
- Trauma in Pregnancy (**Warm** Normal Saline) only if Whole Blood/TXA is not available
- Hemorrhagic Shock in Pregnancy (**Warm** Normal Saline)

CONTRAINDICATIONS

- None in the emergency setting

PRECAUTIONS

- Particular care must be taken in the presence of significant coronary heart disease, CHF, and renal failure patients

Oral Glucose

CLASSIFICATION
- Caloric supplement

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Glucose is a form of natural sugar that is normally produced by the liver. Glucose is a source of energy and all the cells and organs in your body need glucose to function properly.

MECHANISM OF ACTION
- Restores blood glucose levels in hypoglycemia and provides a source of carbohydrate calories

INDICATIONS
- Hypoglycemia

CONTRAINDICATIONS
- Not conscious enough to swallow
- < 2 years old

PRECAUTIONS
- None in the emergency setting

Oxygen

CLASSIFICATION
- Gas

PREGNANCY CATEGORY
- Unassigned

DESCRIPTION
- Oxygen is an odorless, tasteless, colorless gas.

MECHANISM OF ACTION
- Oxygen enters the body through the respiratory system and is transported to the cells by hemoglobin, found in the red blood cells. Oxygen is required for the efficient breakdown of glucose into a usable energy form. The administration of enriched oxygen increases the oxygen concentration in the alveoli, which subsequently increases the oxygen saturation of available hemoglobin.

PHARMACOKENETICS
- **Onset:** Immediate
- **Peak Effects:** < 1 minute
- **Duration:** < 2 minutes
- **Half-Life:** N/A

INDICATIONS
- SpO_2 < 95% for all patients
  - **Exception**: SpO_2 < 90% for COPD & Asthma patients
- 2 LPM NC
  - All Stroke patients (increase oxygen therapy as needed)
- 15 LPM via NRB regardless of SpO_2
  - All 3rd trimester pregnancy trauma patients
  - All head injury patients
  - All actively seizing and postictal patients
  - All patients in hemorrhagic shock
  - Ketamine or Droperidol administration for sedation
  - Carbon Monoxide exposure
  - Cyanide exposure
  - Decompression sickness

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- Oxygen should only be administered in a concentration that will correct hypoxia. It should be titrated to avoid hyperoxia. The administration of high concentrations of oxygen to neonates for a prolonged period of time can damage the infant's eyes (retinopathy of prematurity). Although this is rarely a problem in prehospital care, it is a consideration in long-distance and prolonged transport.

Rocephin (Ceftriaxone)

CLASSIFICATION
- Broad-spectrum cephalosporin antibiotic

PREGNANCY CATEGORY
- Category B

DESCRIPTION
- Ceftriaxone is a sterile, semisynthetic, broad-spectrum cephalosporin antibiotic

MECHANISM OF ACTION
- Ceftriaxone is a bactericidal agent that acts by inhibition of bacterial cell wall synthesis. Ceftriaxone has activity in the presence of some beta-lactamases, both penicillinases, and cephalosporinases of Gram-negative and Gram-positive bacteria.

PHARMACOKINETICS
- **Onset:** Sudden
- **Duration:** 8 hours
- **Half-Life:** 5-9 hours

INDICATIONS
- Sepsis Alert
- Open Fractures

CONTRAINDICATIONS
- Allergy to Cephalosporin antibiotics (e.g., Ancef, Ceclor, Cefdinir, Keflex)
- Neonates

SIDE EFFECTS
- Diarrhea
- Dizziness
- Nausea
- Vomiting
- Headache
- Precipitation in the IV line may occur if Rocephin is administered simultaneously with calcium containing IV solutions

Rocuronium Bromide (Zemuron)

CLASSIFICATION
- Non-depolarizing neuromuscular blocker

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Rocuronium bromide is a non-depolarizing neuromuscular blocker or muscle relaxant used to facilitate advanced airway procedures by providing skeletal muscle relaxation.
- Onset varies depending on dosage administered

MECHANISM OF ACTION
- Rocuronium acts by binding competitively to cholinergic receptors at the motor end plate to antagonize the action of acetylcholine, an effect that is reversible in the presence of acetylcholinesterase inhibitors, such as neostigmine and edrophonium.

PHARMACOKINETICS
- **Onset:** 30-60 seconds
- **Peak Effects:** 1-3 minutes
- **Duration:** 30-60 minutes
- **Half-Life:** 14-18 minutes

INDICATIONS
- Induction for Advanced Airway Procedures

CONTRAINDICATIONS
- Hypersensitivity/allergy to Rocuronium or other non-depolarizing neuromuscular blocking agents
- Predicted difficult intubation (i.e. obesity, short neck, small mouth)
- Major facial or laryngeal trauma
- Patient who cannot be ventilated with a BVM
- Acute asthma

PRECAUTIONS
- Cardiovascular disease or advanced age may slow onset time

SIDE EFFECTS
- Slight elevation of heart rate and blood pressure
- Tachycardia in children
- Bronchospasm (rare)

Sodium Bicarbonate

CLASSIFICATION
- Alkalinizing agent

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Sodium Bicarbonate is a salt that provides bicarbonate to buffer metabolic acidosis, which can accompany several disease processes

MECHANISM OF ACTION
- Combines with excessive acids to form a weak, volatile acid
- Increases pH

PHARMACOKINETICS
- **Onset:** Immediate
- **Peak Effects:** < 15 minutes
- **Duration:** 1-2 hours
- **Half-Life:** N/A

INDICATIONS
- Hyperkalemia with related cardiac arrhythmias/ECG abnormalities
- Really Wide Complex Tachycardia
- Tricyclic Antidepressant (TCA) or Cocaine Overdose
- Behavioral Emergencies/Excited Delirium: Rapid cooling for a temperature > 103 degrees F
- Cardiac arrest special considerations: Excited Delirium

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- **DO NOT** administer in same IV/IO line as Calcium Chloride without thoroughly flushing the line

SIDE EFFECTS
- Metabolic alkalosis when administered in large quantities
- Tissue necrosis if the IV infiltrates

Solu-Medrol (Methylprednisolone)

CLASSIFICATION
- Corticosteroid and anti-inflammatory

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Potent, anti-inflammatory synthetic steroid

MECHANISM OF ACTION
- Inhibits many of the substances that cause inflammation (cytokines, interleukin, interferon) and also inhibit the synthesis of pro-inflammatory enzymes
- Considered an intermediate-acting steroid

PHARMACOKINETICS
- **Onset:** 1-2 hours
- **Peak Effects:** 8-24 hours (IV)
- **Duration:** 1-5 weeks (IV)
- **Half-Life:** 3.5 hours

INDICATIONS
- Moderate/Severe Allergic Reaction
- Bronchospasms secondary to COPD/Asthma/Pneumonia

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- A single dose of Solu-Medrol is all that should be given in the prehospital phase of care. Long-term steroid therapy can cause GI bleeding, prolonged wound healing, and suppression of adrenocortical steroids

SIDE EFFECTS
- Fluid retention
- CHF
- Hypertension
- Abdominal distention
- Vertigo
- Headache
- Nausea
- Malaise
- Hiccups

Suboxone (Buprenorphine)

CLASSIFICATION
- Opioid Analgesic

PREGNANCY CATEGORY
- Category C

DESCRIPTION
- Suboxone contains four parts Buprenorphine and one part Naloxone.
- Buprenorphine works by tricking the brain into thinking that it is receiving a full dose of an opioid, while Naloxone blocks the activation of opioid receptors, thereby reversing the euphoric effects of Buprenorphine.

MECHANISM OF ACTION
- Partial agonist at mu and kappa opioid receptors and as an antagonist at delta receptors.
- If Buprenorphine is attached to the receptor, other full agonists typically used such as Heroin, Oxycodone, or Morphine will not displace Buprenorphine.

PHARMACOKINETICS
- **Onset:** 30 minutes
- **Peak Effects:** 3-4 hours
- **Duration:** 24 hours
- **Half-Life:** 20 -70 hours

INDICATIONS
- For maintenance treatment of opioid dependence and should be used as part of a complete treatment plan to include counseling and psychosocial support.

CONTRAINDICATIONS
- Hypersensitivity/allergy to Buprenorphine or Naloxone

PRECAUTIONS
- Should not be combined with other CNS depressants like alcohol or Benzodiazepines; otherwise, this can lead to respiratory depression.
- Higher than normal and repeated doses of Naloxone may be necessary in the event of a Suboxone overdose.
- The introduction of Buprenorphine will cause an antagonist effect whenever Heroin or other opioids are already on the receptors. If the patient is not withdrawing from opiates, the introduction of Buprenorphine may precipitate acute withdrawals.

SIDE EFFECTS
- Insomnia
- Withdrawal Syndrome
- Anxiety
- Depression
- Rhinitis
- Nausea
- Constipation
- Abdominal Pain
- Diarrhea
- Sweating
- Back Pain
- Headache

Tranexamic Acid (TXA)

CLASSIFICATION
- Antifibrinolytic agent

PREGNANCY CATEGORY
- Category B

DESCRIPTION
- Tranexamic Acid is not a pro coagulant, it simply prevents the breakdown of the clot that is forming.

MECHANISM OF ACTION
- Tranexamic Acid is a synthetic, reversible, competitive inhibitor to the lysine receptor found on plasminogen. The binding of this receptor prevents plasmin (activated form of plasminogen) from binding to and ultimately stabilizing the fibrin matrix.

PHARMACOKINETICS
- **Onset:** 5-15 minutes (IV/IO)
- **Peak Effects:** 5-15 minutes (IV/IO)
- **Duration:** 3 hours (IV/IO)
- **Half-Life:** 2 hours (IV/IO)

INDICATIONS
- Whole Blood Transfusion
- Head Injuries
- Hemorrhagic Shock
- Trauma arrest secondary to penetrating Trauma

CONTRAINDICATIONS
- Time of injury > 3 hours
- Hemorrhagic shock in Pregnancy with onset of hemorrhage > 3 hours
- Gastrointestinal (GI) bleeding

PRECAUTIONS
- **DO NOT** administer in same IV/IO line as Whole Blood without thoroughly flushing

SIDE EFFECTS
- Seizures
- Headaches
- Backache
- Abdominal pain
- Nausea
- Vomiting
- Diarrhea
- Fatigue
- Pulmonary embolism
- Deep vein thrombosis
- Anaphylaxis
- Impaired color vision
- Visual disturbances

Versed (Midazolam)

CLASSIFICATION
- Sedative, anticonvulsant, and hypnotic

PREGNANCY CATEGORY
- Category D

DESCRIPTION
- Versed is a short acting benzodiazepine with strong anti-seizure, hypnotic, and amnesic properties.

MECHANISM OF ACTION
- Midazolam is a potent but short acting benzodiazepine. Benzodiazepines bind to specific sites on GABA Type A receptors within the brain. Benzodiazepines have no direct effect on the GABA receptors, but do potentiate the effects of GABA within the brain. Increased GABA levels cause sedation. Through this mechanism, the benzodiazepines display their hypnotic, anxiolytic, and anticonvulsant effects.

PHARMACOKINETICS
- **Onset:** 3-5 minutes (IV), 15 minutes (IM)
- **Peak Effects:** 20-60 minutes
- **Duration:** < 2 hours (IV), 1-6 hours (IM)
- **Half-Life:** 1-4 hours

INDICATIONS
- Seizures
- Bradycardia - Sedation for Transcutaneous Pacing:
  - If unable to establish vascular access and patient is normotensive
- Post intubation sedation
- Cocaine Overdose:
  - If patient presents with stable SVT, WCT, chest pain, or HTN
- Chemical Control:
  - If patient suddenly wakes up after Ketamine administration
  - Mild/Moderate Behavioral Emergencies in Adults
- Eclampsia

CONTRAINDICATIONS
- Hypotension

PRECAUTIONS
- Monitor for respiratory depression

SIDE EFFECTS
- Laryngospasms/bronchospasms
- Dyspnea, respiratory depression/arrest
- Drowsiness, amnesia, altered mental status
- Bradycardia, tachycardia, PVCs

Whole Blood

CLASSIFICATION
- Blood Product

PREGNANCY CATEGORY
- Unassigned

DESCRIPTION
- Low Titer Leukoreduced O+ Whole Blood

MECHANISM OF ACTION
- Provides balanced hemostatic resuscitation of red blood cells, platelets, and plasma that can be transfused in the prehospital or in-hospital settings.

INDICATIONS
- Any patient in traumatic arrest (PEA ≥ 20 beats per minute) secondary to:
  - Penetrating trauma **WITHOUT** conclusive signs of death
  - Blunt trauma **AND** ROSC has been achieved

OR

- Any patient with evidence/suspicion of massive hemorrhage **AND** one of the following:
  - Adult:
    - Systolic Blood Pressure (SBP) < 70 mmHg
    - Systolic Blood Pressure (SBP) < 90 mmHg **AND** Heart Rate (HR) ≥ 110 beats per minute
      - Consideration to Whole Blood administration should be given to patients who are prescribed Beta Blockers and/or Calcium Channel Blockers with a HR < 110 beats per minute.
    - EMS Captain/Flight Crew discretion
  - Pediatric:
    - Refer to the "Handtevy" system for pediatric Whole Blood/TXA administration criteria
    - EMS Captain/Flight Crew discretion

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- The risk of fetal demise from hemolytic disease of the fetus and newborn due to anti-D alloimmunization in Rh(D)-negative females is low following transfusion.

SIDE EFFECTS
- Allergic Reaction
- Fever
- Acute Immune Hemolytic Reaction
- Blood-borne Infections

Zofran (Ondansetron)

CLASSIFICATION
- Antiemetic

PREGNANCY CATEGORY
- Category B

DESCRIPTION
- Antiemetic properties occur as a result of serotonin receptor antagonism

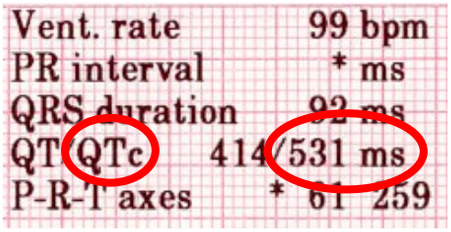
MECHANISM OF ACTION
- Blocks the serotonin receptors in the CTZ (Chemoreceptor Trigger Zone), the stomach, and the small intestines

PHARMACOKINETICS
- **Onset:** 10-30 minutes
- **Peak Effects:** 1.5 hours
- **Duration:** 8 hours
- **Half-Life:** 3 hours

INDICATIONS
- Nausea/Vomiting

CONTRAINDICATIONS
- None in the emergency setting

PRECAUTIONS
- Caution shall be used when the patient has QTc > 500



SIDE EFFECTS
- Headache
- Lightheadedness/Dizziness
- Drowsiness
- Constipation

Acetylcholine receptors - a receptor in the membranes of certain cell structures, such as synapses or the neuromuscular junction, to which the transmitter substance acetylcholine binds

Acetylcholinesterase - an enzyme that causes rapid hydrolysis of acetylcholine. Its action serves to stop excitation of a nerve after transmission of an impulse

α_1- (*alpha*$_1$) Adrenergic receptor - a site on a cell that upon interaction with epinephrine or norepinephrine, controls vasoconstriction, intestinal relaxation, pupil dilation and other physiological processes

α_2- (*alpha*$_2$) Adrenergic receptor - alpha 2 receptors in the brain stem and in the periphery inhibit sympathetic activity and thus lower blood pressure.

Agonist - a substance that initiates a physiological response when combined with a receptor

Alkalinizing Agents - drugs used to manage disorders associated with low pH

Analgesic - any member of the group of drugs used to achieve analgesia, pain relief

Antagonist - a medication or other substance that blocks or dampens a biological response by binding to and blocking a receptor rather than activating it like an agonist would

Anticholinergic Agent - a substance that blocks the neurotransmitter acetylcholine in the central and the peripheral nervous system. These agents inhibit parasympathetic nerve impulses by selectively blocking the binding of the neurotransmitter acetylcholine to its receptor in nerve cells.

Anxiolytic - drugs used to reduce anxiety

B_1 (*beta*$_1$) Andrenergic Receptor - increases cardiac output by raising the heart rate, impulse conduction, and contraction, thereby increasing the left ventricular ejection fraction; increases juxtaglomerular renin secretion; increases gastric secretion of ghrelin (the hunger hormone, which contrasts to leptin, the satiation hormone).

β_2 (*beta*$_2$) Adrenergic Receptor - a cell membrane-spanning beta-adrenergic receptor that interacts with (binds) epinephrine and mediates physiologic responses such as smooth muscle relaxation (vasodilation) and bronchodilation

β_1 (*beta*$_1$) Selective Blockers - a subclass of beta blockers that are commonly used to treat high blood pressure

Catecholamine - a class of aromatic amines that includes a number of neurotransmitters such as epinephrine and dopamine

Cation - a positively charged ion (i.e., one that would be attracted to the cathode in electrolysis)

Chemoreceptor Trigger Zone (CTZ) - the chemoreceptor trigger zone (CTZ) is an area of the medulla oblongata that receives inputs from blood-borne drugs or hormones, and communicates with other structures in the vomiting center to initiate vomiting

Cholinergic receptors - chemical sites in effector cells or at synapses through which acetylcholine exerts its action

Chronotropic - affecting the rate especially of the heartbeat

Cortical system - the furrowed outer layer of gray matter in the cerebrum of the brain, associated with the higher brain functions including voluntary movement, coordination of sensory information, learning, memory and consciousness

Dihydropyridine - a molecule based upon pyridine, and the parent of a class of molecules that have been semi-saturated with two substituents replacing one double bond. They are particularly well known in pharmacology as L-type calcium channel blockers, used in the treatment of hypertension.

Dromotropic - affecting the conductivity of cardiac muscle

Edrophonium - a readily reversible acetylcholinesterase inhibitor. It prevents breakdown of the neurotransmitter acetylcholine and acts by competitively inhibiting the enzyme acetylcholinesterase, mainly at the neuromuscular junction. It is sold under the trade names Tensilon and Enlon.

Emetic - a medicine or other substance which causes vomiting.

GABA - the major inhibitory neurotransmitter of the central nervous system. Its principle role is reducing neuronal excitability throughout the nervous system. It is also directly responsible for the regulation of muscle tone. There are two classes of GABA receptors: $GABA_A$ and $GABA_B$. $GABA_A$ receptors are ligand-gated ion channels (also known as ionotropic receptors); whereas $GABA_B$ receptors are G protein-coupled receptors, also called metabotropic receptors.

H_1 receptor - a receptor for histamine on cell membranes that modulates the dilation of blood vessels and the contraction of smooth muscle

Hypotonic - having a lower osmotic pressure than a particular fluid, typically a body fluid or intracellular fluid

Inotropic - affecting the force of muscular contractions

In-Vitro - performed or taking place in a test tube, culture dish, or elsewhere outside a living organism

Isotonic - denoting or relating to a solution having the same osmotic pressure as some other solution, especially one in a cell or a body fluid

Limbic system - a complex system of nerves and networks in the brain, involving several areas near the edge of the cortex concerned with instinct and mood

Neostigmine - an anticholinesterase drug used especially in the diagnosis and treatment of myasthenia gravis and in the treatment of urinary bladder or bowel atony

Metabolic acidosis - a condition that occurs when the body produces excessive quantities of acid or when the kidneys are not removing enough acid from the body resulting in a low pH in the blood and tissues. If unchecked, metabolic acidosis leads to acidemia, i.e., blood pH is low (less than 7.35) due to increased production of hydrogen ions by the body or the inability of the body to form bicarbonate (HCO_3^-) in the kidney

NMDA (N-methyl-D-aspartate) receptor - a glutamate receptor and ion channel protein found in nerve cells. It is activated when glutamate and glycine (or D-serine) bind to it, and when activated it allows positively charged ions to flow through the cell membrane. The NMDA receptor is very important for controlling synaptic plasticity and memory function.

Opioid Receptors - a receptor that binds opioids (including endogenous opioids) and mediates their effects via G proteins. It is generally agreed that there are at least three classes: mu (μ), kappa (κ), and delta (δ) opioid receptors. Opioid receptors are widely distributed in the brain, spinal cord, and periphery, and each type of receptor is differentially distributed.

Parasympathetic nervous system - one of two divisions of the autonomic nervous system, which is responsible for stimulating the “rest-and-digest” or “feed-and breed” activities that occur when the body is at rest

Parasympatholytic - a substance or activity that reduces the activity of the parasympathetic nervous system

Phencyclidine derivative - a synthetic compound derived from piperidine, used as an anesthetic drug

Serotonin - a monoamine neurotransmitter known as a contributor to feelings of well-being and happiness, though its actual biological function is complex and multifaceted, modulating cognition, reward, learning, memory, and numerous physiological processes, such as vasoconstriction

Sympathetic nervous system - one of two divisions of the autonomic nervous system, which has a primary process of stimulating the body’s “fight or flight” response. It is also active at a basic level to maintain homeostasis homeodynamics**.**

Sympathomimetic - producing physiological effects characteristic of the sympathetic nervous system by promoting the stimulation of sympathetic nerves

Synthesis - the production of a substance by the union of chemical elements, groups, or simpler compounds or by the degradation of a complex compound