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# Allegheny General Hospital LifeFlight

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## Pediatric Protocols

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Version 2016

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LifeFlight Protocols  
Pediatric Protocols  
Version 2016**

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**ALTERED MENTAL STATUS**

Criteria: All children with alteration in consciousness which is unexpected and non-traumatic or as a result of a traumatic event.

Protocol:

1. Secure and maintain a patent airway and provide O<sub>2</sub> to keep oxygen saturation > 95%.
2. Maintain c-spine immobilization if trauma suspected. If GCS <8 and unable to maintain sats >95% on N<sub>R</sub>F<sub>M</sub>, assist ventilations with a bag-valve-mask and 100% FiO<sub>2</sub>. Consider intubation (RSI Protocol).
3. If Glucose <60, administer Dextrose 10% 2 ml/kg IV/IO.  
If no IV access, and patient wt < 20 kg give Glucagon 0.02mg-0.03mg/kg IM (Max dose 0.5 mg). If wt > 20 kg the dosage is the same as adults (1 mg IM).  
Refer to Hypoglycemia Protocol.
4. Recheck blood glucose in 5 minutes if no change in mental status and repeat the Dextrose 10% as above PRN.
5. Consider Narcan 0.1 mg/kg IV/IO or IN (MAD Protocol)(Max dose 2 mg). If wt > 20 kg or age > 5 years administer 2 mg IV/IO/IN.

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**ANAPHYLAXIS**

Criteria: Exposure to allergens causing respiratory compromise, cardiovascular collapse (hypotension), nausea, vomiting, and/or skin/mucosal involvement (hives, pruritus, flushing, or swelling of the lips-tongue-uvula).

Protocol:

1. Maintain airway and provide supplemental O<sub>2</sub> to keep SaO<sub>2</sub> > 95%.
2. If patient perfusing well or if unable to obtain IV access quickly, give IM (in the anterior lateral thigh) Epinephrine 1:1,000 dose 0.01 mg/kg (0.01 ml/kg) every 15 minutes as needed.
3. Establish IV of Normal Saline and give a 10-20 ml/kg Bolus as needed.
4. Benadryl 1 mg/kg IV/IM or IO (maximum of 25-50 mg) (H1 Antagonist)
5. Solumedrol 2 mg/kg IV or IO.
6. If the patient shows signs and symptoms of severe shock/hypoperfusion resistant to the above measures consider "Push-Pressor Epinephrine or infusion per below:
  1. <30 kg (<10 years-old) go straight to an Epinephrine infusion at 0.1 – 0.5 mcg/kg/min, titrate to MAP of 65 mmHg.
  2. >30 kg (Age 10 and above) Push-pressor Epi 1:100,000 (1ml of 1:10,000 mixed with 9 ml of normal saline) push 0.5 – 1 ml q 2 minutes until acceptable vitals.
  3. > 50 kg Push-pressor Epi 1:100,000, push 1 – 2 ml every 2 minutes until acceptable vitals.

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1. If no response to IV Epinephrine consult Medical Command.

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**ASTHMA/BRONCHIOLITIS  
(Lower Airway Disorders)**

Criteria: Asthma is manifested by hyper-reactive airways and bronchospasms in which reversible airflow obstruction can be demonstrated. Bronchiolitis is the inflammatory obstruction of the terminal bronchioles. It is a viral infection most frequently caused by RSV and causes most problematic symptoms in children <1 year.

Indications:

1. Dyspnea
2. Nasal flaring
3. Costal retractions
4. Tachycardia
5. Wheezing

Protocol:

1. Maintain a patent airway.
2. Administer humidified FiO<sub>2</sub> 100% via blow-by or NRFM. Maintain SaO<sub>2</sub> > 95%.
3. Allow the child to determine position of comfort.
4. Aerosolized Albuterol 5mg Neb, may increase to 10 -15 mg Neb as needed for level of distress. If intubated, give in-line through ETT.
5. If ineffective, administer 0.01ml/kg Epinephrine 1:1000 IM (max dose 0.5 ml). Repeat every 20 minutes x2 as needed.
6. Solumedrol 2 mg/kg IV/IO, if not already treated by referring physician.
7. Consider aerosolized racemic Epinephrine 0.05 ml/kg /dose diluted to 3 ml with NS over 15 min. q 1 hour. Max dose 0.5 ml
8. Perform RSI as indicated. The induction agent of choice in this situation is Ketamine 2 mg/kg IV/IO. Do not use Ketamine in hypertensive patients or those with cardiac risk factors. See RSI Protocol.

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Magnesium Sulfate 50 mg/kg IV/IO over 10-20 minutes. (Contraindication – Magnesium is contraindicated if on Digoxin or with renal insufficiency.)

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**ADMINISTRATION OF BLOOD**

Indications: The infant or child who exhibits signs of inadequate tissue perfusion due to trauma or persistent blood loss (tachycardia, delayed capillary refill, lethargy and hypotension (a late sign)).

- Protocol:
1. Maintain patent airway and provide supplemental O<sub>2</sub> to keep SaO<sub>2</sub> > 95%. Consider intubation (RSI Protocol).
  2. Give PRBC O neg or type and cross matched 10 ml/kg.
  3. Repeat additional PRBC 10 ml/kg if child continues to exhibit signs of inadequate perfusion or persistent blood loss. (If necessary O pos can be given).

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**BURNS**

- Criteria: Any child with 2° partial thickness or 3° full-thickness burns.  
Any child with an electrocution injury.  
Any child with a suspected inhalation injury secondary to a thermal insult.  
Any child with tissue destruction related to chemical contact.
- Indications: Early management and appropriate stabilization play a significant role. Children's skin is thinner than adult skin; therefore they sustain greater injury than adults from a similar burn.
- Protocol:
1. Secure and maintain a patent airway as well as adequate respiratory effort.  
Maintain c-spine immobilization if trauma involved.
  2. Administer 100% FiO<sub>2</sub> via NRFM. If an inhalation injury is suspected, provide humidifier O<sub>2</sub>. Refer to RSI Protocol.
  3. Determine if inhalation injury may lead to obstruction.
- Absolute Intubation Criteria
1. Erythema, swelling, or blistering of oro/nasopharyngeal mucosa.
  2. Soot in pharynx
  3. Mechanism (closed space)
  4. Hoarseness, stridor, brassy cough
  5. Wheezes, rales
  6. Grunting, flaring, retracting
  7. Agitation, stupor cyanosis
  8. SaO<sub>2</sub> < 90
- Relative Criteria for Intubation
4. Singed eyebrows or nasal hair
  5. Facial burns
4. Remove any burned or wet clothing as well as jewelry.
  5. Determine burn percentage
    - a. If < 10%, may use wet dressings.
    - b. If > 10%, may use only dry, clean dressings.
    - c. Keep warm.
  6. Establish peripheral IV access or IO access as indicated. Administer a 20 ml/kg bolus of normal saline, repeat as indicated in the resuscitation.
  7. Determine infusion rate 4 ml X Wt. in kg X %burn over the first 24 hours. Administer ½ of total infusion amount in the first 8 hours from onset of burns. (See attached Burn Chart).

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8. For electrical burns, give 20 ml/kg NS bolus until adequate urine output (1 ml/kg/hr). For myoglobinuria infuse at a wide-open rate until urine begins to clear.
9. If possible, place a urinary catheter prior to inter-facility transport. Do not delay transport if concurrent injuries mandate expeditious transfer.
10. Morphine 0.1 mg/kg IV/IO/IM every 3-5 minutes or Fentanyl 1-2 mcg/kg IV/IO/IM or IN (MAD Protocol) every 15 minutes PRN pain. Assess for respiratory depression if not intubated. Refer to Pain Protocol.
11. Perform chest escharotomy if signs of symptoms of ventilatory compromise (i.e. circumferential chest burn).
12. Destination: West Penn is the region's only certified Pediatric Burn center. If a pediatric burn patient has injuries that meet trauma criteria, then the traumatic injuries take priority and the patient should be transported the nearest appropriate Pediatric trauma center first.

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In case of circulatory compromise in extremities with circumferential burns, determine time frame for delivery to burn center. Call for transport times >4 hours for permission to perform extremity escharotomy.

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**CONGESTIVE HEART FAILURE**

Criteria:           Alteration of myocardial performance  
                          Initiation and full manifestation of compensatory mechanisms  
                          Pulmonary venous congestion  
                          Systemic venous congestion

Protocol:

1.           Maintain patent airway and provide supplemental O<sub>2</sub> to keep SaO<sub>2</sub> > 95%.
2.           Refer to RSI Protocol.
3.           Elevate head of stretcher.
4.           Initiate Saline-lock or KVO line IV/ IO.

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1.           Lasix 1 mg/kg IV or IO.
2.           Morphine 0.1 mg/kg IV/IO/IM.
3.           Consider Dopamine infusion at 2-5 mcg/kg/min.

(Concentrations per pharmacy standard)

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**CYANOTIC CONGENITAL HEART DEFECT**

Criteria: Cyanosis and persistent hypoxemia in the infant during hyperventilation with 100% oxygen and age greater than two weeks old.

Protocol:

1. Maintain patent airway and provide supplemental 100% O<sub>2</sub> by blow by technique.
2. Place infant in knee chest position. (If the patient has Tetralogy of Fallot and is having a tet spell).

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1. Consider Morphine Sulfate 0.1 mg/kg IV/IM/IO.
2. Consider Sodium Bicarbonate 4.2% 1 mEq/Kg IV/IO.

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**DKA**

Criteria: Diagnosed or highly suspected DKA.

- Protocol:
1. Maintain patent airway and provide supplemental O2 at 100%.
  2. IV or IO NSS; initial fluids should be no faster than 10 ml/kg/hour. Accept on going tachycardia and mild signs of delayed perfusion, for too rapid administration is a risk factor for the development of cerebral edema. If the patient shows severe signs of shock, you may bolus the patient with NSS 10 ml/kg IV or IO. Keep volume just enough to show some improvement in perfusion, remember risk of cerebral edema.
  3. After 1 hour of NSS at 10 ml/kg/hr a Regular Insulin infusion at 0.1 Units/kg/hr may be initiated if available from outlying facility. Regular insulin boluses are no longer recommended in peds patients due to risk for the development of cerebral edema. If blood glucose drops below 250mg/dl decrease infusion to 0.05 units/kg/hr. If blood glucose drops < 180mg/dl, continue insulin infusion at 0.05 units/kg/hr and change maintenance IV fluids to D5NS. Contact medical command.
  4. Avoid the administration of sedating medications in DKA patients. This is because frequent neuro checks must be done to monitor for signs of the development of cerebral edema.

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**ASYSTOLE / PEA**

Criteria: Absent pulse accompanied by apnea.

- Protocol:
1. Confirm rhythm in another lead.
  2. Initiate CPR with a minimum of 2-minute cycles of uninterrupted chest compressions. Keep any breaks between cycles to an absolute minimum, just long enough to assess for a ROSC. To maximize the potential for ROSC (just as in adults), resuscitation must be initiated immediately where the patient is found, unless the scene is unsafe. In that case, quickly move the patient to the closest safe area and immediately begin resuscitation. Remember that compared to adults, pediatric arrests often occur from respiratory issues and BVM ventilation with oxygen should be initiated at the beginning of resuscitation.
  3. Identify and treat cause (severe hypoxemia, severe acidosis, severe hypovolemia, tension pneumothorax, cardiac tamponade, and profound hypothermia, poisons, drugs, hypo/hyperkalemia, and thromboembolism).
  4. Secure a patent airway and ventilate with 100% oxygen. Monitor ETCO<sub>2</sub> continuously to assess for ROSC.
  5. Refer to RSI Protocol.
  7. Secure IV or IO access.
  8. Epinephrine  
IV/IO: 0.01 mg/kg (0.1 ml/kg of the 1:10,000 solution)  
ETT: 0.1 mg/kg (0.1 ml/kg, 1:1,000 solution)
  9. Subsequent doses of Epinephrine may be repeated every 3 to 5 minutes.
  10. Administer 20ml/kg NS fluid bolus.
  11. If hypothermia is suspected, initiate re-warming techniques.
  12. If tension pneumothorax is suspected, perform needle decompression.

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**VENTRICULAR FIBRILLATION/ PULSELESS VENTRICULAR  
TACHYCARDIA**

Criteria: Ventricular fibrillation/Pulseless V-tach

- Protocol:
1. Initiate CPR, continue with as few interruptions of chest compressions as possible.
  2. Defibrillate X1 at 2 J/kg.
  3. Resume CPR immediately.
  4. Establish a definitive airway and provide 100% O<sub>2</sub>.
  5. Obtain IV/IO access.
  6. Check rhythm if shockable defibrillate at 4 J/kg.
  7. Resume CPR immediately.
  8. Epinephrine first dose:
    - a. IV/IO: 0.01 mg/kg (0.1 ml/kg of the 1:10,000 solution).
    - b. ETT: 0.1 – 0.2 mg/kg (0.1-0.2 ml/kg of 1:1,000 solution)
    - c. Repeat every 3 to 5 minutes as indicated. Continue CPR for approximately 1 minute after administration.
  9. Check rhythm and Defibrillate 4 J/kg as indicated; CPR, repeat approximately 1 minute after each medication.
  10. Initiate medications: Options:
    - a. Amiodorone 5mg/kg bolus IV/IO
    - b. Lidocaine 1 mg/kg IV/IO
    - c. Magnesium 25-50 mg/kg for Torsades/ Hypomagnesemia
  11. Continue CPR / Drug / Shock pattern as indicated.

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**VENTRICULAR TACHYCARDIA**

Criteria: Regular ventricular rate of 120-400 with QRS >0.08 seconds. Suspect V-tach if underlying heart disease, prolonged QT syndrome, acute hypoxemia, acidosis, tricyclic overdose, electrolyte imbalance and poison ingestion. (See wide complex tachycardia protocol).

Protocol:

1. Supplemental O<sub>2</sub>, ideally patient is intubated and ventilated with 100% O<sub>2</sub>. Refer to RSI Protocol.
2. Secure IV/IO access.
3. If stable: give Lidocaine 1mg/kg followed by infusion of 20 to 50 mcg/kg/min.
4. If unstable; Synchronized cardioversion 0.5 to 1 J/kg, if unsuccessful increase to 2 J/kg.

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1. If Lidocaine unsuccessful and patient remains stable: consider:
  - a) Amiodarone 5mg/kg IV over 30 minutes followed by an infusion at 5 – 10 mcg/kg/min. (Concentrations per pharmacy standard)
  - OR
  - b) Procainamide 15mg/kg IV over 30 minutes followed by an infusion at 20 – 80 mcg/kg/min. (Conc. Per pharmacy standard)
2. Do not routinely administer these drugs together.

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**WIDE COMPLEX TACHYCARDIA SECONDARY TO INGESTION OR POISONING DUE TO  
SODIUM CHANNEL BLOCKERS**

Criteria: Wide Complex at a rate of 120-400 with a QRS > 100 ms and a prolongation of the QTc > 440 ms. Substances to include: Cyclic anti-depressants, Quinidine, Procainamide, Phenothiazines, Group IC antiarrhythmics, Norflex, and local anesthetics.

Protocol:

1. Supplemental oxygen. Intubation if necessary and ventilate with 100% oxygen. Refer to RSI Protocol.
2. Establish IV/IO access, for hypotension give NSS 20 ml/kg boluses.
3. Sodium Bicarbonate 4.2% 1-2 meq/kg IV/IO, if complex does not narrow after bicarbonate administration, may repeat as necessary.
4. If unresponsive to bicarbonate, use appropriate protocol for life-threatening dysrhythmia.

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For persistent hypotension, Epinephrine and Norepinephrine have been shown to be more effective than Dopamine in this scenario.

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**TACHYARRHYTHMIAS  
(HEMODYNAMICALLY UNSTABLE)**

Criteria:       **Probable SVT**  
Heart rate > 220 Infants, > 180 Children with signs of cardiovascular compromise.

- Protocol:
1.       Supplemental O<sub>2</sub>, consider intubation and ventilation with 100% O<sub>2</sub>, but do not delay cardioversion if indicated.
  2.       Secure vascular access, but should not delay cardioversion.
  3.       Consider Adenosine 0.1 mg/kg rapid IV bolus and flush with 10 ml NSS.  
(Max 6mg first dose)
  4.       If no response, double the initial Adenosine dose up to 12 mg maximum.  
**OR**
  5.       Consider sedation for cardioversion: Midazolam 0.1 mg/kg IV/IO IN (Max 5 mg/dose) or Ketamine 1 mg/kg IV/IO.
  6.       Synchronized cardioversion 0.5 – 1 J/kg, if tachycardia persists, increase to 2 J/kg

Criteria:       **Probable VT**

- Protocol:
1.       Immediate cardioversion 0.5-1 J/kg, if not effective increase to 2 J/kg.
  2.       Consider sedation (per above), do not delay cardioversion.
  3.       Consider one of the following medications:  
          Amiodarone 5 mg/kg IV/IO over 30 minutes  
**OR**  
          Procainamide 15mg/kg IV/IO (at a rate not to exceed 50mg/min). (Do not administer Amiodarone and Procainamide together.)  
**OR**  
          Lidocaine 1 mg/kg IV/IO/ETT  
          (Wide complex only)

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**BRADYARRHYTHMIAS**

Criteria: Heart rate of less than 60 beats per minute associated with poor systemic perfusion, even if BP is normal.

Protocol:

1. Maintain patent airway and provide 100 % supplemental O<sub>2</sub>.
2. Initiate IV/IO access.
3. If HR remains < 60 in infants and children after oxygenation and ventilation begin chest compressions.
4. Then administer Epinephrine:  
IV/IO: 0.01 mg/kg (0.1 ml/kg of 1:10,000 solution)  
ETT: 0.1-0.2 ml/kg of the 1:1,000 solution.  
Repeat same dose every 3-5 minutes.
5. If no response, after two doses, consider Epinephrine Infusion 0.1 – 0.5 mcg/kg/min. Titrate for a MAP of 65 mmHg.
6. For vagally induced bradycardia or symptomatic bradycardia give Atropine 0.02mg/kg with a minimum dose of 0.1mg. Maximum dose is 0.5 mg for child or 1mg for an adolescent. May repeat dose 1 time in 3 min.
7. For bradycardia refractory to Atropine or if associated with Second degree type II or Third degree AV block consider external pacing. Refer to Pacing Protocol

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**EPIGLOTTITIS / CROUP / BACTERIAL TRACHEITIS**  
(Upper Airway Disorders)

**Criteria:** Epiglottitis and Bacterial Tracheitis can be a life threatening emergency resulting from a rapidly progressive upper respiratory bacterial infection that leads to inflammation and edema. Croup is a viral infection of the upper airway with slow progressive symptoms.

**Indications:** In Epiglottitis, septicemia has disseminated to the epiglottis causing a cherry-red swollen epiglottis which can occlude the trachea. Patients with croup will have an inflamed upper airway while those with bacterial thracheitis typically have a thick inflammatory membrane throughout the upper airway.

**Protocol:**

1. Determine severity of distress. Provide supplemental O<sub>2</sub> as tolerated by humidified mask or blow-by.
  - a. If mild or moderate distress and patient is cooperative keep patient in upright position. Minimize procedures and discomfort including IV starts and looking into patient's mouth unless absolutely necessary.
  - b. If moderate to severe and patient is incapable of cooperating, administer Epinephrine 1 mg of 1:1000 aerosol in 5 ml NSS or NSS diluent, aerosolized and blow over patient's face. Use dosage of 2.5ml of the Epinephrine mixture for children <10 Kg and 5ml of the Epinephrine mixture for children > 10 Kg.
  - c. If in severe distress, respiratory failure, and patient is tiring and in pre-arrest state, intubate emergently (RSI Protocol). The patient will likely need an ETT a size or two smaller than anticipated. If intubation is not successful, consider Cricothyrotomy or other alternative adjunct.
  - d. While attempting, or if unable to acquire, an artificial airway, a BVM may be successful in Epiglottitis.
2. Parent may accompany child only if absolutely necessary and if cleared by the pilot.

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**FOREIGN BODY OBSTRUCTION OF AIRWAY**

Criteria: Previously healthy child who develops sudden onset of coughing, wheezing, stridor or some other manifestation of airway obstruction.

Protocol: Incomplete Obstruction: (phonation, coughing present)

1. Avoid agitation, allow position of comfort.
2. Apply supplemental O<sub>2</sub> to maintain SaO<sub>2</sub> > 95%.
3. Anticipate complete obstruction.

Complete Obstruction:

1. Children <1 yr: Perform jaw lift, if object visualized then perform finger sweep. Attempt to ventilate, if still obstructed then reposition and reattempt ventilation. If unsuccessful, give five repetitive back blows and five chest thrusts. Repeat above sequence until effective or 1 minute has passed then proceed to number 3.
2. Children 1-8 years of age: perform jaw lift, if object visualized then perform finger sweep. Attempt to ventilate, if still obstructed then reposition and reattempt ventilation. If unsuccessful give 5 abdominal thrusts, repeat above sequence until effective or 1 minute has passed then proceed to number 3.
3. If still unable to ventilate, perform laryngoscopy and remove foreign body using Magill Forceps.
4. Attempt vigorous BVM ventilation. A mainstem bronchus obstruction still permits one-lung ventilation. Also, a right mainstem intubation may force the object down, pull the tube back 1-2 cm, then attempt to ventilate the left lung.

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**HEAT ILLNESS**

Criteria: Exposure to heat, elevation of body temperature > 39° C, sweating may be present or absent. Patient may exhibit signs of CNS dysfunction such as headache, confusion, psychotic behavior, seizures or coma, hypotension, tachycardia and tachypnea.

- Protocol:
1. Provide for a patent airway; oxygenation with 100% O<sub>2</sub>.
  2. Place cold packs to neck, axilla and inguinal regions.  
Monitoring rectal temperature if possible.
  3. IV/IO of NSS at maintenance rate unless exhibiting signs of vascular collapse, then give NSS 20ml/kg bolus. Refer to IV Maintenance Protocol.
  4. Use glucometer for glucose check. If < 60 administer Dextrose 10% 2 ml/kg IV/IO.  
If no IV access, and patient wt < 20 kg give Glucagon 0.02mg-0.03mg/kg IM (Max dose 0.5 mg). If wt > 20 kg the dosage is the same as adults (1 mg IM).  
Refer to Hypoglycemia Protocol.
  5. Recheck blood glucose in 5 minutes if no change in mental status and repeat the Dextrose 10% as above PRN.

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Place Foley catheter to monitor urine output for transports >45 minutes.

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**HYPOGLYCEMIA**

Criteria: Plasma glucose level < 60 mg/dl even in the absence of symptoms.

Protocol:

1. Maintain patent airway. Provide supplemental O<sub>2</sub> at 100%.
2. Administer Dextrose 10% 2 ml/kg IV/IO.  
If no IV access, and patient wt < 20 kg give Glucagon 0.02mg-0.03mg/kg IM (Max dose 0.5 mg). If wt > 20 kg the dosage is the same as adults (1 mg IM).  
Refer to Hypoglycemia Protocol.
3. Recheck blood glucose in 5 minutes if no change in mental status and repeat the Dextrose 10% as above PRN.
4. D<sub>5</sub>W based upon IV Fluid Maintenance Protocol.

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**HYPOTHERMIA**

Criteria: Patients with core body temperature < 36° C

Protocol:

1. For all hypothermic patients:
  - a. Maintain airway, breathing, and circulation.
  - b. Monitor cardiac rhythm.
  - c. If trauma involved, maintain immobilization with a hard collar and sliding transfers, refer to multiple trauma protocol. Otherwise, maintain horizontal position.
  - d. Avoid rough movement and excess activity.
  - e. Remove wet garments.
  - f. Protect against heat loss and wind chill by using blankets and circumferential wrap.
  - g. If hypothermic scene-flight patient is pulseless begin treatment as outlined and initiate transport immediately. Note: this represents a deviation from our usual policy of not transporting patients who are in arrest.
  - h. If hot packs are utilized on the patient, make sure they are insulated with a towel or cravat.
2. For mild hypothermia (34° - 36° C)
  - a. Passive rewarming as above and keep environment warm.
3. For moderate hypothermia 30° – 34° C)
  - a. Passive rewarming as above.
  - b. Active external rewarming of truncal areas only (hot packs to axilla and groin).
4. For severe hypothermia (< 30° C)
  - a. Active internal rewarming
    1. Warm IV/IO fluids ( 42° C)
    2. Warm, humidified O<sub>2</sub> (42° – 46° C). (May warm humidifier with hot packs).
5. If pulse/breathing absent:
  - a. Start CPR
  - b. Defibrillate VT/VF as indicated at 2 – 4 J/kg.
  - c. Intubate, Refer to RSI Protocol
  - d. Ventilate with warm, humid oxygen (42°-46°C).
  - e. Establish IV/IO if not previously done.
  - f. Infuse warm normal saline 20 ml/kg IV/IO (42°C)

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- NOTES:**
1. If core temperature < 30°C:
    - a. Continue CPR
    - b. Withhold IV/IO medications.
    - c. Limit defibrillation to 2 – 4 J/kg X1 until temp >30°C.
  
  2. If core temperature > 30°C:
    - a. Continue CPR
    - b. Give IV/IO medications as indicated (but at longer than standard intervals).
    - c. Repeat defibrillation for VF/VT as core temperature rises.

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**HYPOVOLEMIA**

Criteria: Signs or symptoms of poor tissue perfusion with evidence on history or physical exam of active bleeding, severe trauma, vomiting, diarrhea or fever.

Indications: Capillary refill >2 seconds  
Agitation/ restlessness/ decreased responsiveness  
Tachycardia  
Tachypnea  
Dry mucous membranes  
Low urine output  
\*Hypotension is a LATE sign

Protocol:

1. Maintain patent airway and provide supplemental O<sub>2</sub> to keep SaO<sub>2</sub> >95%.
2. Assist ventilations with BVM if indicated; consider intubation. Refer to RSI Protocol
3. Establish IV/IO access with large bore needle.
4. Bolus with 20 ml/kg of NSS as fast as possible. Repeat x 1 as needed.
  - a. If perfusion improves (mentation, Cardiac Output, capillary refill, etc.) maintain infusion at 10 – 15 ml/kg/hr. Refer to IV maintenance protocol.
  - b. If any suspicion of blood loss initiate blood infusion 10ml/kg bolus. Repeat prn. Refer to Blood Administration Protocol.
5. If there is suspicion of possible pelvic or lower extremity fracture, splint to control bleeding.

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**IV FLUID MAINTENANCE**

Criteria: Maintenance fluid requirements for infants and children.

Protocol:

1. Initiate 2 IV lines if possible. Do not delay transport to establish IV access. If unable to obtain IV establish IO access.
2. IV/IO fluid maintenance dose of NSS according to weight of child:  
    Infants <10 kg: 4 ml/kg/hr  
    Children 11-20 kg: 40 ml/hr plus 2 ml/hr for each kg from 11-20.  
    Children > 20 kg: 60 ml/hr plus 1 ml/hr for each kg from 21-60.
3. Decrease IV fluids to KVO if suspected increased intracranial pressure or otherwise indicated by patient assessment.
4. IV attempts are to be limited to 2 per nurse, then proceed to IO access. If the patient's condition is immediately life threatening you may go directly to IO access.

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**MULTIPLE TRAUMA**

Criteria: Mechanism of injury sufficient to cause blunt or penetrating trauma.

Protocol:

1. Maintain patent airway and provide supplemental oxygen at 100% NRFM if breathing spontaneously.
2. Ventilate with 100% oxygen via BVM if child cannot maintain sat > 95%, maintain C-spine immobilization. Intubate utilizing RSI protocol as indicated.
3. Examine chest for tension/open pneumothorax and treat if found.
4. Circulation with hemorrhage control in the following order: direct pressure, pressure points, tourniquet and or Combat Gauze (Hemostatic Dressing Protocol).
5. In the prehospital setting immobilize neck with semi-rigid collar and sliding transfers or maintain LBB/HID if already immobilized.  
Interhospital transports any patients who have had their spines cleared by referring physicians do not have to be re-immobilized for LifeFlight transport. If there are concerns of potential spinal injuries, distracting injuries, or cervical spine compromise, apply a c-collar and perform sliding transfers (while maintaining C-spine control) with each patient movement from one stretcher to another.
6. Initiate transport as soon as possible. Pediatric trauma patients age 14 and under must be taken to a Pediatric Trauma center unless moribund conditions exist.
7. Establish IV/IO access.
8. If signs of inadequate tissue perfusion of ongoing blood loss give 0 neg or type and cross- matched blood 10ml/kg. Refer to Blood Administration Protocol.
9. Consider gastric decompression with OGT or NGT if not contraindicated and urinary catheter for flights >1 hour.

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**NAUSEA/VOMITING**

Criteria: Treatment or prevention of motion sickness, nausea or vomiting

Contraindications: Comatose state  
Allergy to promethazine (Phenergan)/sulfites  
Patients who have received CNS depressant drugs  
Age <2 years

Protocol:

1. Maintain patient airway and provide supplemental O<sub>2</sub> to keep SaO<sub>2</sub> >95%.
2. Zofran 0.1 mg/kg IV/IO/IM if < or equal to 40 kg and 4 mg IV/IO/IM if > 40 kg.
  - a. Alternatively: Benadryl can be given 1 mg/kg IV/IM/or IO. (Maximum 25-50 mg)
  - b. **H1 Antagonist, do not use if Benadryl's sedating side effects are contraindicated as in head injury or DKA).**

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**NEONATAL RESUSCITATION**

- Criteria: Resuscitation of the neonate.
- Indications: If delivery is imminent, deliver prior to departure and assess need for neonatal team and incubator.
- Protocol:
1. Suction mouth and then nose while delivering. \*Note: if thick meconium, intubate trachea and suction until clear before other resuscitation steps are taken.
  2. Dry, warm and stimulate newborn. Position on back with head down (sniffing position).
  3. APGAR scores @ 1 and 5 minutes as time permits.
  4. If respiratory effort: absent, slow irregular, or gasping; ventilate with BVM and 100% O<sub>2</sub>.
  5. If HR <60, initiate chest compressions in addition to BVM. If HR >60 or <100, VENTILATE ONLY.
  6. For persistent bradycardia despite O<sub>2</sub> and compressions, intubate, obtain IV/IO access, and administer Epinephrine 1:10,000 at 0.01 mg/kg (0.1 ml/kg) and a fluid bolus of NSS 10 – 20 ml/kg.
  7. Note time of delivery.
  8. Reassess neonate frequently (every 5 minutes) for signs of distress.

Contact Medical Command

Notify of delivery and status of newborn.

1. If persistent hypoxia/cyanosis despite the above interventions consider the following differential diagnoses: Left-sided obstructive lesion (coarctation of the aorta, interrupted aortic arch, critical aortic stenosis, hypoplastic left heart) with patent ductus arteriosus / Persistent pulmonary hypertension of the newborn with patent ductus arteriosus / Transposition of great vessels with left-sided obstructive lesion and patent ductus arteriosus / Transposition of great arteries with persistent pulmonary hypertension and a patent ductus arteriosus.
2. If a diagnosis in #1 is suspected administer Prostaglandin E1 at 0.1 mcg/kg/min IV infusion. Reduce dose to a minimal amount that maintains therapeutic response. Max dose of 0.4 mcg/kg/min.
3. Obtain expert consultation.

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**PAIN PROTOCOL**

Indications: Suspected fractures  
Dislocations  
Painful wounds  
Painful procedures

Contraindications: Altered mental status  
Shock /hypotension

Protocol:

1. Maintain patent airway provide supplemental O<sub>2</sub> to keep SaO<sub>2</sub>>95%.
2. Monitor pulse ox and ECG.
3. Morphine Sulfate:  
If <20kg give 0.1 mg/kg IV/IO/IM.  
If >20kg give 2-4 mg IV/IO/IM.  
Repeat every 5 minutes as needed.  
**OR**
4. Fentanyl: 1 to 2 mcg/kg IV/IO/IM slow IVP to avoid rigid chest syndrome. The same dose can also be given IN (MAD Protocol).  
Repeat every 15 minutes as needed.
5. Monitor vitals/pulse ox closely.
6. In cases of intractable pain, not responsive to the management above Ketamine 0.2 mg/kg can be administered IV/IO every 3 minutes, until appropriate analgesia (without inducing unresponsiveness) is achieved. Once analgesia is achieved the dose can then be repeated as needed, for pain control, no more frequently than every 10 minutes. You can add narcotic analgesics as needed, at the lower dose, as directed above. Remember that the goal is pain control, not sedation

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**POISONINGS/ INGESTIONS**

Criteria: Known accidental or intentional exposure to or ingestion of potentially lethal dose or substance.

Protocol:

1. Provide for patent airway and oxygenation to maintain SaO<sub>2</sub> >95%. Provide for early intubation if substance is caustic. Use conservative respiratory management if substance is petroleum distillate. Refer to RSI Protocol as needed.
2. IV/IO of D5/NS at maintenance rate unless otherwise contraindicated (see IV Maintenance Protocol).

Contact Medical Command

1. Report substance involved for more specific intervention.
2. Activated Charcoal in aqueous solution 1 gm/kg of body weight PO, indicated for acute ingestion only. Contraindications include: altered mental status, potential to lose airway patency, and prolonged time since ingestion.

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**RETROPHARYNGEAL ABCESS / PERITONSILLAR ABCESS**

Criteria: Retropharyngeal abscess: Usually seen in children <3 yrs., gradual onset of sore throat, fever, drooling, difficulty swallowing and muffled voice.  
Peritonsillar abscess: Usually seen in children >8 yrs, presentation of sore throat, difficulty swallowing, ipsilateral ear pain, drooling and “hot potato” voice.

Protocol:

1. Apply supplemental humidified oxygen at 100%.
2. Avoid agitation: allow position of comfort.
3. BVM ventilation and intubation for obstruction.
4. If unable to ventilate: percutaneous cricothyrotomy only if age 10 or above. Remember that child size may vary greatly and, younger children may be of appropriate size.

Contact Medical Command

1. Discuss the addition of antibiotics if not already administered.  
Suggestions include:  
Clindamycin 10 mg/kg IV (Max 450 mg)  
Or  
Unasyn 25 mg/kg IV (Max 1-2 grams)
2. Consider the administration of steroids. Suggestions include:
  - a. Decadron 0.1 mg/kg IV/IM to a max of 10 mg.
  - b. Solumedrol 2mg/kg to a max of 125 mg IV.

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**RAPID SEQUENCE INTUBATION**

Criteria: Difficult to intubate for reasons such as trismus, present gag reflex, combativeness.  
Must be able to maintain airway post RSI if the intubation attempt is unsuccessful.

Contraindications:

1. Inability to maintain BVM seal and inability to perform surgical cricothyrotomy.
2. Known history of pseudocholinesterase deficiency, known history of malignant hyperthermia, renal failure with hyperkalemia, severe soft tissue damage, including burns or crush injuries >48 hours old, and some neuromuscular disorders (e.g. Duchenne's muscular dystrophy). Rocuronium 1 mg/kg is substituted for Succinylcholine in these cases due to potential hyperkalemia.
3. Relative contraindication-Globe rupture as fasciculations will increase ocular pressure.

Protocol:

1. Preoxygenate with 100% O<sub>2</sub>.
2. If bradycardia occurs and persists during intubation attempt Atropine 0.02 mg/kg IV/IO (Minimum dose 0.1 mg). There is no need for pretreatment unless the patient is already bradycardic after appropriate ventilation assistance has been initiated.
3. Etomidate 0.2 – 0.3 mg/kg IV/IO or Ketamine 2 mg/kg (sedative of choice in Status Asthmaticus or profound hypotension) or Midazolam 0.1 to 0.3 mg/kg IV/IO/IM (Avoid Midazolam if the patient is suspected to be hypovolemic or is hypotensive).
4. Ketamine is the drug of choice in asthma. It can be used in head injured patients with hypotension. Ketamine is contraindicated in hypertensive patients, hypertensive head injured patients, and in patients with known cardiac risk factors. If increased bronchial secretions become an issue after Ketamine administration, you may give Atropine 0.02 mg/kg (min dose 0.1 mg) as long as no contraindications exist. If an emergence phenomenon becomes an issue, you may administer Midazolam per the Sedation Protocol.
5. Succinylcholine 2 mg/kg IV/IO. If unable to establish IV/IO access, then give 4 mg/kg IM.
6. Orally intubate patient after adequate relaxation is achieved. (Limit intubation attempts to 3 total).



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7. Confirm tube placement by auscultation over epigastrium and lung fields; pulse oximetry; and ETCO<sub>2</sub> monitoring.
8. If intubation attempts are unsuccessful after 3 attempts, ventilate the patient with BVM, utilize appropriate airway adjuncts, and transport.
9. If unable to ventilate with BMV, or patient deteriorates, perform cricothyroidotomy if age 10 and above.
10. Refer to sedation protocol as needed.

Consider gastric decompression with OGT or NGT, if not contraindicated.

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**SEDATION / MUSCLE RELAXATION – INTUBATED**

- Criteria: For use in the intubated child to enhance artificial respirations or prevent dislodging of ET tube and IV lines.
- Contraindication: Non-intubated child.
- Protocol:
1. Give Midazolam 0.1 mg/kg IV/IO/IN (Max 5mg/dose) (MAD Protocol)  
Or Ativan 0.05 – 0.1 mg/kg IV/IO (Max 2mg/dose)  
Or Ketamine 2 mg/kg IV/IO
  2. For muscular relaxation, child must be intubated and placement of endotracheal tube confirmed; give Rocuronium 1 mg/kg IV/IO, only after sedation has failed to achieve desired results
  3. Analgesia; administer Morphine 0.1 mg/kg (max 4 mg)  
or  
Fentanyl 1 mcg/kg IV, IO, if not contraindicated.

**SEDATION NON-INTUBATED PATIENT**

- Criteria: For non-intubated children requiring sedation, examples of indications include cardioversion and painful procedures such as the splinting of angulated fractures.
- Contraindication: Midazolam and Ativan are not for use as analgesia.
- Protocol:
1. Midazolam 0.05 mg/kg IV/IO/IN (Max 5mg/dose) (MAD Protocol) for light sedation,  
OR Ativan 0.05 mg/kg IV/IO (Max 2mg/dose),  
OR Ketamine 1 mg/kg IV/IO. May repeat every 3 minutes until appropriate sedation is achieved.

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**SEIZURES**

Criteria: For use in children displaying CNS insult resulting from abnormal and uncontrolled activity of cerebral neurons to prevent the child from injury during seizure activity, prevent respiratory arrest, control seizures, and prevent seizure recurrence.

Indications:

1. Cerebral trauma
2. Fever
3. Metabolic disorders
4. Hypoglycemia
5. Anoxia
6. Ingestion of toxic substances

Protocol:

1. Secure and maintain a patent airway. Maintain cervical immobilization if trauma involved.
2. Administer 100% FiO<sub>2</sub> via non-rebreather mask, assist ventilator with BVM as needed, consider intubation. RSI Protocol
3. Administer Dextrose 10% 2 ml/kg IV/IO.  
If no IV access, and patient wt < 20 kg give Glucagon 0.02mg-0.03mg/kg IM (Max dose 0.5 mg). If wt > 20 kg the dosage is the same as adults (1 mg IM).  
Refer to Hypoglycemia Protocol.
4. Recheck blood glucose in 5 minutes if no change in mental status and repeat the Dextrose 10% as above PRN.
5. If glucose level is unavailable or glucose is >60, administer Ativan 0.05 mg/kg to 0.1 mg/kg IV/IO over 3 minutes (Max 2mg/dose). May repeat every 5 minutes X 2 or Midazolam 0.15 mg/kg IV/IO (Max 5 mg/dose).
6. If IV/IO unavailable, give Midazolam 0.15 mg/kg IN (Max 5mg/dose) (MAD Protocol)

Contact Medical Command

If seizure activity continues or chemical paralysis initiated post seizure:  
Administer Fosphenytoin 20 mg PE/kg IV/IO at a rate less than 2 mg PE/kg/min.

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**SHOCK**

DISTRIBUTIVE, NEUROGENIC, ANAPHYLACTIC, CARDIOGENIC

Criteria:

<b>CLINICAL CHARACTERISTICS OF SHOCK*</b>			
Signs	Hypovolemic	Cardiogenic	Distributive
Heart rate	+++	++++	+++
Respiratory rate	++	+++	++
Work of breathing	Normal	++ to ++++	0 to ++++
Pulse volume	0 to ++	0 to +	0 to ++++
Capillary refill	> 2 sec.	> 4 sec.	> or < 2 secs
Skin temperature	Cool	Cold	Warm to cold
Skin color	Pale	Pale-ashen	Pink-ashen
Mottling	+ to +++	++++	+ to ++++
Level of consciousness	Normal to coma	Depressed-coma	Normal to coma
Liver size	Normal	Enlarged	Normal
Acidosis	+ to +++	++ to ++++	+ to ++++
Urine output	< 1 cc/kg/hr	< 1 cc/kg/hr	< 1 cc/kg/hr

\*The likelihood of a specific sign is indicated by the number of plus (+) signs.

Protocol:

1. Maintain patent airway and provide 100% supplemental O<sub>2</sub>.
2. IV/IO fluid bolus of NSS 20 ml/kg. (10 ml/kg for cardiogenic source). Repeat as needed. Consider administration of blood if hypovolemic and history of or ongoing blood loss.
3. Refer to Blood Administration and IV Maintenance Protocols
4. In patients with a history of adrenal hypoplasia/adrenal insufficiency; consider steroids early. You may administer Hydrocortisone 1-2 mg/kg IV (to be obtained from referring hospitals).

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1. Give patient history and physical exam and discuss further orders.

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**SEPSIS / SEPTIC SHOCK**

Criteria: History of fever of uncertain origin or known infection associated with normal or low BP, tachycardia and tachypnea.

Protocol:

1. Provide for a patent airway and provide supplemental O<sub>2</sub> to keep SaO<sub>2</sub> >95%.
2. Resuscitation with Normal Saline 20 ml/kg boluses to total of 40 ml/kg; titrate to keep MAP ≥ 65 mmHg.
3. If hypotension not responsive to fluid resuscitation, begin a Levophed (Norepinephrine) infusion 0.1 – 0.5 mcg/kg/min. (Concentrations per pharmacy standard).
4. As a temporizing measure till the infusion is mixed, you may use “push-pressor” Epinephrine:
  - a. >30 kg (Age 10 and above) Push-pressor Epi 1:100,000 (1ml of 1:10,000 mixed with 9 ml of normal saline) push 0.5 – 1 ml q 2 minutes until acceptable vitals.
  - b. > 50 kg Push-pressor Epi 1:100,000, push 1 – 2 ml every 2 minutes until acceptable vitals.
5. On interhospital transports, confirm that the appropriate broad-spectrum antibiotics have been ordered and continue any antibiotic administrations in progress or that have not been initiated yet. If none have been ordered, contact Medical Command to coordinate, with the referring Physician, which antibiotics need to be administered and initiate them during transport. (Antibiotics to be obtained from the referring facility).
  - a. Consider Rocephin 50 mg/kg IV to max of 1 gm.

Contact Medical Command

1. For refractory septic shock with known or suspected acidosis consider a Vasopressin infusion 0.01 to 0.1 units/min IV. Usual dose is less than 0.04 units/min. (To be obtained from referring facilities).
2. If Levophed (Norepinephrine) unsuccessful at 0.5 mcg/kg/min, MAP <65 mmHg and Vasopressin is not available consider adding an add Epinephrine infusion 0.1 to 0.5 mcg/kg/min, titrate for blood pressure >90 mmHg. (Concentrations per pharmacy standard)

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**TRANSCUTANEOUS PACING**

Criteria: Profound symptomatic bradycardia refractory to BLS and ALS measures.

- Protocol:
1. Set rate to 100.
  2. Set mA to 20.
  3. Increase mA by 5 until capture occurs.
  4. Check for pulse with capture.
  5. Consider sedation with Versed 0.05 mg/kg IV/IO/IN (Max 5 mg/dose) or Ketamine 1mg/kg IV/IO for non-intubated patients.

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Consider Pain Control

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**HEMOSTATIC DRESSING PROTOCOL**

To rapidly control life threatening external hemorrhage

**PROCEDURE:**

**A. INDICATIONS:**

1. Life threatening venous and/or arterial extremity hemorrhage not amendable to the placement of tourniquets
2. Apply after tourniquet application to control hemorrhage. After a minimum of 15 minutes without any bleeding, team may attempt to release the tourniquet. If hemorrhage resumes, replace tourniquet and make no more attempts at early tourniquet release unless ordered by command.
3. Life threatening venous and/or arterial hemorrhage from a junctional injury (axilla or groin) or neck
4. Uncontrolled external hemorrhage from the scalp, thorax, or abdomen despite having applied adequate and continued pressure with non-hemostatic bandaging.

**B. CONTRAINDICATIONS:**

1. None

**C. EQUIPMENT:**

1. Combat Gauze: Roll or Z folded (4 in. X 4 yds.), vacuum packed gauze.
2. Personal Protective Equipment

**D. PROCEDURE:**

1. Examine the wound and identify the point of bleeding, specifically, the bleeding vessel.
2. Sweep the wound clear of any accumulated blood or clots prior to packing.
3. Pack Combat Gauze directly over the point of bleeding, starting with good initial contact and maintaining it throughout the packing.
4. Pack the entire Gauze without losing or releasing contact with the point of bleeding
5. Once the entire Gauze is packed, maintain pressure for 3-5 minutes.
6. Avoid lifting the Gauze to re-assess during that period.
7. If the Gauze soaks through and active bleeding continues, remove the entire Gauze and repeat steps 1-6 with a new Combat Gauze.
8. If bleeding is relatively well controlled or hemostasis is established, cover the wound with a bandage to secure the Gauze in place for transport.

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H. COMPLICATIONS:

1. Hemorrhagic Shock
2. Uncontrolled Hemorrhage
3. Allergic Reaction

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**MAD Protocol  
Intranasal Medication Administration**

**KEYWORDS:** Intranasal, Medication, Mucosal Atomization Device, Emergency Department

**POLICY**

To outline the procedure for the administration of medications via the intranasal route for use in the Emergency Department setting

**RESPONSIBILITIES**

- A. **Flight Nurse / Physician**
  - 1. Assess for appropriate patient population/indication
  - 2. Select medications/dosages as indicated
  - 3. Assess for adverse events
  - 4. Assess for appropriate patient population/indication
  - 5. Administer medication intra-nasally, using a Mucosal Atomization Device (MAD)
  - 6. Assessment and documentation of the level of sedation and/or pain when appropriate
  - 7. Assess for adverse events.

**DEFINITIONS**

- B. Intranasal medication administration – the delivery of medication into the nares for systemic absorption
- C. Mucosal Atomization Device (MAD) - delivers intranasal medication in a fine mist which enhances absorption and improves bioavailability for fast and effective drug delivery
- D. Medication administration indications relevant to this policy:
  - 1. Treatment of seizures (adults and pediatrics)
  - 2. Anxiety (adults and pediatrics)
  - 3. Transient pain control (traumatic and non-traumatic) (adults and pediatrics)
  - 4. Acute opioid overdose, or suspicion of overdose (adults and pediatrics)

*\*Intranasal drug administration at AGH is NOT intended to be used for conscious sedation\*  
Contact Medical Command if no other option appears to be available.*

- E. Medications relevant to this policy:
  - 1. Sedatives
    - a. Benzodiazepines
      - i. Midazolam (5mg/mL concentration)
  - 2. Analgesics
    - a. Opioid Analgesics
      - i. Fentanyl (50mcg/mL concentration)

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3. Other
  - a. Opioid antagonists/Reversal Agents
    - i. Naloxone (1mg/mL concentration)

**PROCEDURES/PROTOCOLS**

- F. Collaborative evaluation of patient by physician, nurse, and/or pharmacist to determine appropriateness for intranasal route of medication administration
  1. Situations where intranasal drug administration may not be warranted due to the potential for decreased drug absorption/medication response:
    - a. Epistaxis
    - b. Nasal trauma
    - c. Nasal septal abnormalities
    - d. Nasal congestion/discharge
- G. Nurse - perform baseline pain scale assessment when indicated
- H. Physician or Flight RN (calculate dosage based on patient weight) therapy to be given via intranasal route (*Attachment 1*)
- I. Nurse – administer medication therapy following the general medication administration procedure for intranasal drug delivery:
  1. Verify medication dosage based on patient weight
  2. Gather equipment (medication, 3cc syringe, MAD)
  3. Load syringe with appropriate volume of medication (add 0.1mL for dead space of MAD)
    - a. Max volume amount per nostril = 1mL (if greater than 1mL per nostril is needed, consider dose titration with 5 – 10 minute intervals between drug administration)
  4. Attach MAD to 3cc syringe
  5. Place atomizer into the nostril
  6. Briskly compress syringe to administer one half of the volume in the 3cc syringe into the nostril as atomized spray
  7. Remove syringe from nostril and administer remaining volume into the second nostril
- J. Assess patient for medication-related adverse events
- K. Evaluate medication effectiveness

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**Intranasal Medication Dosing Tables (Adult and Pediatric)**

**Intranasal Midazolam dosing table (5mg/mL concentration) – Based on a dose of 0.2mg/kg**

Weight Increments (kg)	IN Midazolam Dose (mg)	Total Volume (mL)*
3 - 3.3	0.6	0.12
3.4 - 3.8	0.7	0.14
3.9 - 4.4	0.8	0.16
4.5 - 5.4	1	0.2
5.5 - 6.6	1.2	0.24
6.7 - 7	1.4	0.28
7.1 - 8.2	1.5	0.3
8.3 - 9.1	1.8	0.36
9.2 - 10.4	2	0.4
10.5 - 11.4	2.2	0.44
11.5 - 13.8	2.5	0.5
13.9 - 16.4	3	0.6
16.5 - 18.6	3.5	0.7
18.7 - 21.4	4	0.8
21.5 - 23.6	4.5	0.9
23.7 - 26.4	5	1
26.5 - 28.6	5.5	1.1
28.7 - 31.4	6	1.2
31.5 - 33.6	6.5	1.3
33.7 - 36.4	7	1.4
36.5 - 38.6	7.5	1.5
38.7 - 41.4	8	1.6
41.5 - 43.6	8.5	1.7
43.7 - 46.4	9	1.8
46.5 - 47.9	9.5	1.9
≥ 48	10	2

\*Draw up an additional 0.1mL of midazolam into syringe to account for dead space in MAD

**Subsequent Intranasal Midazolam Dosing:**

Repeat Dosing (anxiolysis): allow a minimum of 10 minutes after initial dose to assess patient for the need of additional doses. If additional doses are needed, utilize ½ of the initial intranasal dose every 10 minutes until other access is established.

Repeat dosing (seizure control): If seizure persists > 3 minutes after initial dose, consider repeating dose at ½ the initial intranasal dose if intravenous access has not yet been obtained

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**Intranasal Fentanyl** dosing table (50mcg/mL concentration) – Based on a dose of 2mcg/kg

Weight Increments (kg)	IN Fentanyl Dose (mcg)	Total Volume (mL)*
3 - 3.3	6	0.12
3.4 - 3.8	7	0.14
3.9 - 4.4	8	0.16
4.5	9	0.18
4.6 - 5.4	10	0.2
5.5 - 6	12	0.24
6.1 - 6.9	12.5	0.25
7 - 8.3	15	0.3
8.4 - 9.4	17.5	0.35
9.5 - 10.9	20	0.4
11 - 11.3	22	0.44
11.4 - 13.7	25	0.5
13.8 - 16.6	30	0.6
16.7 - 18.1	35	0.7
18.2 - 22.3	40	0.8
22.4 - 22.7	45	0.9
22.8 - 27.4	50	1
27.5 - 32.9	60	1.2
33 - 37.9	70	1.4
38 - 41.2	80	1.6
41.3 - 45.9	90	1.8
46 - 55.4	100	2
55.5 - 62.4	120	2.4
62.5 - 68.1	130	2.6
68.2 - 80.9	150	3
81 - 89.9	170	3.4
90 - 94.9	180	3.6
> 95	200	4

\*Draw up an additional 0.1mL of fentanyl into syringe to account for dead space in MAD  
Maximum volume per nostril is 1mL. IN fentanyl doses > 100mcg should be divided into multiple increments allowing time for absorption between each intranasal administration (alternate nares until full dose is administered)

\*\*MAX pediatric dose that can be given at one time = 100mcg

\*\*MAX adult dose that can be given at one time = 200mcg

**Subsequent Intranasal Fentanyl Dosing:**

Repeat dosing: (pain control) Allow a minimum of 10 minutes after initial dose to assess patient for the need of additional doses. If additional doses are needed, utilize ½ of the initial intranasal dose every 10 minutes until other access is established.

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## Calculations

**15 kg**

Epi 1:1,000 IM	0.15 mL
Epi 1:10,000 IV	1.5 mL
Amiodarone	1.5 mL
Bicarb 8.4%	15 mL
D <sub>25</sub> W	30 mL
Normal Saline	300 mL
Lorazepam	0.75 mL
Diazepam IV/IN	0.6 mL
ETT / King / LMA	5U / 2 / 2

**20 kg**

Epi 1:1,000 IM	0.2 mL
Epi 1:10,000 IV	2 mL
Amiodarone	2 mL
Bicarb 8.4%	20 mL
D <sub>25</sub> W	40 mL
Normal Saline	400 mL
Lorazepam	1 mL
Diazepam IV/IN	0.8 mL
ETT / King / LMA	5.5U / 2 / 2.5

**25 kg**

Epi 1:1,000 IM	0.25 mL
Epi 1:10,000 IV	2.5 mL
Amiodarone	2.5 mL
Bicarb 8.4%	25 mL
D <sub>25</sub> W	50 mL
Normal Saline	500 mL
Lorazepam	1.25 mL
Diazepam IV/IN	1 mL
ETT / King / LMA	6C / 3 / 2.5

**10 kg**

Epi 1:1,000 IM	0.1 mL
Epi 1:10,000 IV	1 mL
Amiodarone	1 mL
Bicarb 8.4%	10 mL
D <sub>25</sub> W	20 mL
Normal Saline	200 mL
Lorazepam	0.5 mL
Diazepam IV/IN	0.4 mL
ETT / King / LMA	4U / - / 2

**30 kg**

Epi 1:1,000 IM	0.3 mL
Epi 1:10,000 IV	3 mL
Amiodarone	3 mL
Bicarb 8.4%	30 mL
D <sub>25</sub> W	60 mL
Normal Saline	600 mL
Lorazepam	1.5 mL
Diazepam IV/IN	1.2 mL
ETT / King / LMA	6.5C / 3 / 3

**The Handtevy™ Pediatric Code**

1Yr, 3Yr, 5Yr, 7Yr, 9Yr

- Epi 1:1,000 IM 1 mg/mL
- Epi 1:10,000 IV 0.1 mg/mL
- Amiodarone 150 mg/3mL
- Bicarb 8.4% 1 mEq/mL
- D<sub>25</sub>W 0.25 G/mL
- Normal Saline Bolus
- Lorazepam 2mg/mL
- Diazepam IV/IN 10 mg/2mL
- ETT U=Uncuff C=Cuffed

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1. Basic

- a. 1000 mcg = 1 mg
- b. 1:1000 = 1 mg/ml
- c. 1:10000 = 0.1 mg/ml

2. Standard Concentration Method

- a. Infusion rate =  $\frac{\text{body weight} \times \text{desired dose} \times 60}{\text{Concentration of infusion}}$
- b. Lidocaine
  - 1. Add 120 mg Lidocaine to D5W to make 100 ml of solution.
  - 2. Each ml/kg/hr infused will deliver 20 mcg/kg/minute.
- c. Example: To prepare a Lidocaine infusion for an 8 kg child to deliver 30 mcg/kg/min.
  - 1. Add 6 ml of 2% Lidocaine (120 mg) to 94 ml of D5W or D5 NSS (1200 mcg/ml).
  - 2. Rate =  $8 \text{ kg} \times 30 \text{ mcg/kg/min} \times 60 \text{ ml/hr} = 12 \text{ ml/hr}$   
1200 mcg/ml

3. Rule of Six Method

- a. Epinephrine / Norepinephrine (0.1 – 2 mcg/kg/min)
  - 1.  $0.6 \times \text{body weight} = \text{amount of drug to be added to D5W or NSS to make 100 ml of solution.}$
  - 2. Each ml/hr delivers 0.1 mcg/kg/min.
- b. Dopamine/ Dobutamine (2 – 20 mcg/kg/min)
  - 1.  $6 \times \text{body weight} = \text{amount of drug to be added to D5W or NSS to make 100 ml solution.}$
  - 2. Each ml/hr delivers 1 mcg/kg/min.

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**HEART RATE / RESPIRATORY RATE  
(Pediatric)**

[Child's age (y) x 2} + 8 = weight in kg.

Heart rate – varies inversely with age; heart rate increased with temperature, volume loss, anxiety.

Newborns	85 – 150
Infant to 24 months	100 – 140
2 – 6 years	80 – 115
6 – 10 years	70 – 100
> 10 years	55 – 90

Respiratory rate – also varies inversely with age.

Newborns	30 -60
Infant to 24 months	20 - 40
2 – 6 years	20 - 30
6 – 10 years	20 - 25
> 10 years	12 - 20

Blood pressure – hypotension is a late sign.

SBP = 70 + [2 x age (y)]

Newborns and infants: SBP = 60 or 70 respectively.

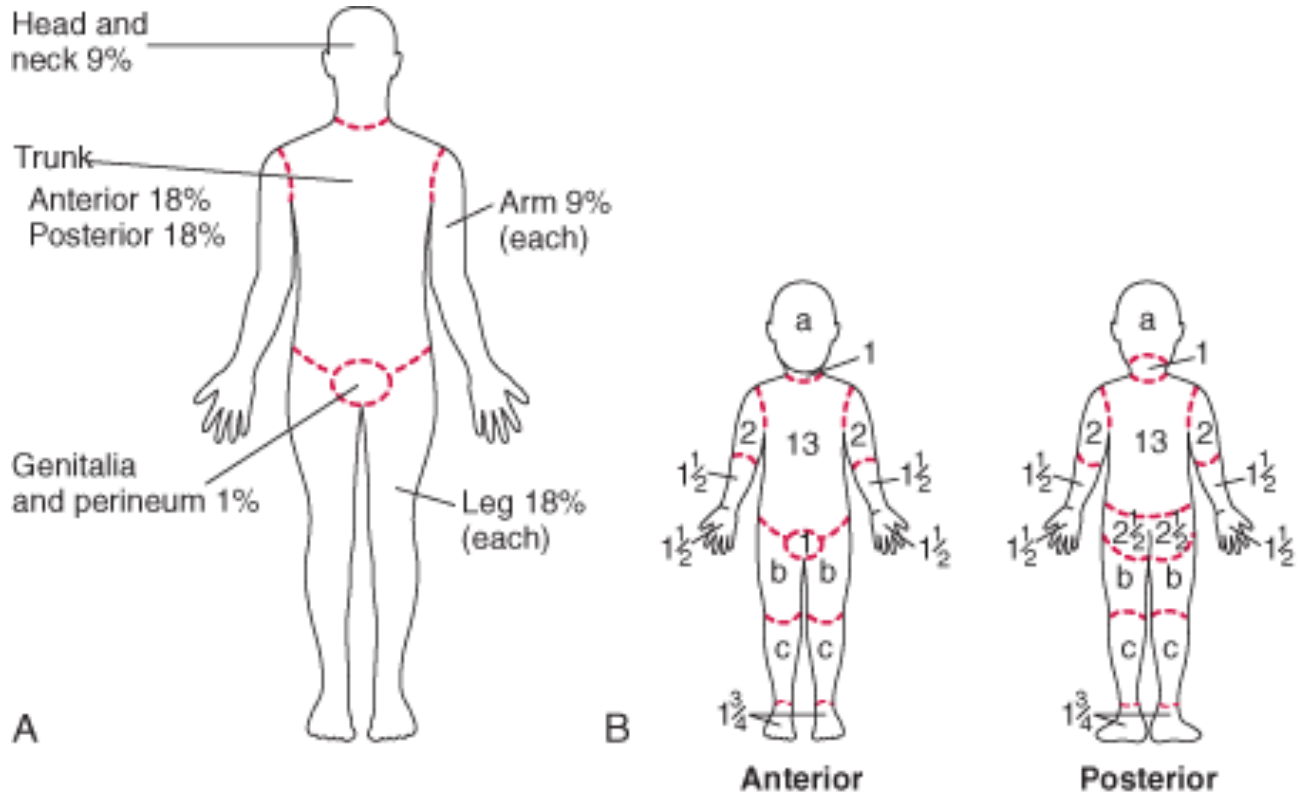
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**Burn Chart**



Relative percentage of body surface area (% BSA) affected by growth

Body Part	Age				
	0 yr	1 yr	5 yr	10 yr	15 yr
a = 1/2 of head	9 1/2	8 1/2	6 1/2	5 1/2	4 1/2
b = 1/2 of 1 thigh	2 3/4	3 1/4	4	4 1/4	4 1/2
c = 1/2 of 1 lower leg	2 1/2	2 1/2	2 3/4	3	3 1/4

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