

**ALS MEDICAL PROTOCOLS**  
**FOR PEDIATRIC PATIENTS**  
**HENNEPIN COUNTY EMS SYSTEM**

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ADULT PROTOCOLS (see separate table of contents)

APPENDICES

## PART I. GENERAL GUIDELINES

1. Age limits for pediatric and adult medical protocols must be flexible. For age less than 13 years, pediatric orders should always apply. Between ages 13 and 18, judgment should be used, although the pediatric orders will usually apply. It is recognized that the exact age of a patient is not always known.
2. Patient Consent and Refusal: Consent or refusal of treatment/transport of minors (less than 18 years) must be given by the child's parent or legal guardian. Although less desirable, consent or refusal may be given by a responsible adult (over age 18) caretaker if the parent has deliberately left the minor in the care of this adult, and the adult is competent and capable. If unsure whether it is appropriate to allow someone to give consent or refuse treatment of a minor, a medical control physician should be consulted. (Also see Adult Protocols).
3. Parents should be allowed to stay with children during evaluation and transport, if appropriate. The parent's lap is usually the best place for the examination of a stable patient.
4. **AIRWAY MANAGEMENT:**
  - A. Airway Devices
    - 1) Do not hyperextend the neck in newborns and infants.
    - 2) Consider oral airway of appropriate size for all unconscious patients.
    - 3) Use liter flow appropriate to the type oxygen mask being used (simple vs. partial rebreathing).
    - 4) For spontaneously breathing patients in shock, high flow oxygen should be given by partial rebreathing mask.
    - 5) Ventilate using oxygen with pediatric mask or pocket mask when ventilation must be assisted.
    - 6) Do not use a positive pressure valve on patients less than 6 years of age.
    - 7) If epiglottitis is a possibility, **do not** attempt to visualize the throat or pharynx. However, if a patient with an airway obstruction has a respiratory or cardiac arrest, the airway may be visualized with a laryngoscope to rule out a foreign body.
    - 8) EOA or Combitube may be used on adolescents of adult size, at least five feet in height. The decision should be based on size, not age. These airways are to be inserted only in apneic patients unless ordered verbally by the medical control physician, and should be used with caution in trauma patients.
    - 9) Endotracheal intubation (ETI) is not a required procedure but is sanctioned by the Hennepin County EMS System for various categories of pediatric patients. ETI is to be performed only by paramedics trained and authorized to intubate and only for those types of patients specified by the ALS Medical Director. Endotracheal intubation shall be performed in accordance with the information and protocol contained in Appendix B and consistent with other protocols in this document.
    - 10) Other airway interventions not required but sanctioned by the System are rapid sequence endotracheal intubation and transtracheal needle ventilation for patients that cannot be ventilated by any other means. These interventions must be authorized by a service's ALS Medical Director and shall be performed in accordance with the information and protocols contained in Appendices C and D.

B. Adjunctive Airway Equipment:

- 1) End-tidal CO<sub>2</sub> monitoring: An end-tidal carbon dioxide (CO<sub>2</sub>) detector may be used (but is not required) to accomplish confirmation of endotracheal tube placement and is most reliable in patients with spontaneous circulation. This device often is not able to detect CO<sub>2</sub> in cardiac arrest patients due to extremely low blood flow to the lungs.
- 2) Pulse oximetry: A pulse oximeter may be used (but is not required) for any patient with suspected hypoxemia, in respiratory distress, or whenever sedating medications are administered. Obtaining a normal pulse oximetry reading does not negate the need for oxygen therapy as specified in these protocols.

C. Drug Administration By Inhalation or Via the Airway:

- 1) The use of the drug Nitronox for pain relief is not required but is sanctioned by the System. This intervention must be authorized by a service's ALS Medical Director and administered in accordance with the information and protocol contained in Appendix E.
- 2) Drugs administered via the endotracheal tube should be instilled as deeply as possible into the tracheobronchial tree using a catheter inserted beyond the distal tip of the ET tube. Drugs may be administered full strength or diluted in 1-2 ml of normal saline.

5. **CARDIAC EMERGENCIES:**

- A. Most critical cardiac states in children are not due to primary cardiac problems but are secondary to respiratory, airway, metabolic, or infectious disorders.
- B. Most standing orders for cardiac arrest states follow the adult orders. However, contact the medical control physician early to have the appropriate drug doses calculated.
- C. Contact the medical control physician early when there is a question about the nature of a presumed cardiac emergency in children.

6. **PEDIATRIC IV'S:**

- A. For trauma and shock of other etiology, start IV's en route.
- B. Hang IV fluid (versus saline lock) when the administration of multiple IV medications or the need for fluid volume replacement is anticipated.
- C. Use minidrip IV infusion sets for non-traumatic emergencies and macrodrip sets for trauma or hypotensive patients.
- D. If IV access cannot be established at the scene in two attempts for patients with non-traumatic problems, begin transport to the hospital. There should be no delay at the scene for IV attempts on children with trauma or in shock - these IV's should be started during transport.
- E. Intraosseous infusion is a procedure which is not required, but is sanctioned by the Hennepin County EMS System for use in children under the age of seven years in critical condition when IV access is unobtainable. This procedure must be authorized by a service's ALS Medical Director and performed in accordance with the information and protocol contained in Appendix I.

7. **CHILDHOOD WEIGHTS AND VITAL SIGNS:**

Age	Kg	Lbs	Heart Rate Upper limit	Heart Rate Lower limit	Systolic BP Lower limit
Newborn	3	7	180	80	40
6 months	7	15	180	80	70
1 year	10	22	180	80	70
2 years	12	26	180	80	80
4 years	16	35	150	75	80
6 years	20	44	150	70	80
8 years	25	55	125	60	85
10 years	34	75	125	60	90
12 years	45	99	125	60	90
14 years	50	110	125	60	90

**PART II. NEWBORN EMERGENCIES**

**STANDING ORDERS**

1. In all situations, minimize heat loss:
  - A. Dry the newborn well.
  - B. Increase environmental temperature.
  - C. Fill two sterile gloves with above-body-temperature (100-104°) water and place next to newborn.
  - D. Use bunting, swaddler or similar device if patient is stable.
2. Suction infant:
  - A. During delivery, suction mouth and oropharynx first, then nose on perineum, before delivery of shoulders.
  - B. If meconium is present at birth, suction the mouth and oropharynx first, then the nose, gently, but as completely as possible, prior to ventilating.
  - C. Monitor heart rate. Cease suctioning if heart rate <80 (monitor apical pulse with stethoscope).
3. Provide physical stimulation if respirations are present but depressed. Suction and position for optimal airway. **Do not** hyperextend the neck.
4. Assist ventilation if respirations are absent, minimal or heart rate <80. Suction and position for optimal airway. **Do not** hyperextend the neck. May use a pediatric mask or pocket mask with supplemental high flow oxygen. **Do not** use positive pressure oxygen valve.
5. Perform chest compressions if apical heart rate is <80/minute despite assisted/adequate ventilation.
6. **Transport early.** Contact med control physician as soon as possible after birth. Attempt to maintain body temperature and assure optimal ventilation and oxygenation.

**PART III. AIRWAY EMERGENCIES****A. ASTHMA ATTACK:**

## 1. If patient breathing

- a) Begin oxygen therapy.
- b) Move patient to ambulance and begin transport.
- c) En route to hospital, may give nebulized albuterol 2.5 mg with Atrovent 0.5 mg added. May repeat neb of albuterol 2.5 mg with Atrovent 0.5 mg X1.
- d) Contact med control physician for patients with continued moderate-to-severe respiratory distress after two nebs.

- e) Consider terbutaline or epinephrine 1:1000 – 0.01 mg/kg (0.01 cc/kg) SC. Max dose = 0.25 cc terbutaline or 0.3 cc epinephrine (to be used in field only if condition severe).
- f) If unresponsive to other treatments and in impending respiratory failure, may consider magnesium sulfate 25 mg/kg IV

## 2. If patient in respiratory arrest:

- a) Insert oral airway and begin positive pressure ventilation. Ventilate with short insp:exp ratio at rate of 8-10/min.
- b) Insert EOA, Combitube (if patient meets size requirements or, if authorized, ET tube as soon as possible.
- c) May administer Terbutaline 0.01 mg/kg (0.01 cc/kg) SC – max dose = .25 mg while awaiting med control contact.
- d) If ET intubated give in-line nebulized albuterol 2.5 mg with Atrovent 0.5 mg added. May repeat neb of albuterol 2.5 mg with Atrovent 0.5 mg X1.
- e) If lung deflation poor, perform manual exhalation.
- f) Obtain IV access and hang N.S. and attach ECG leads while contacting med control physician.

Asthma respiratory arrest continued

## Asthma respiratory arrest continued

- g) If terbutaline not already given consider terbutaline or epinephrine 1:1000 – 0.01 mg/kg (0.01 cc/kg) SC. Max dose = 0.25 cc terbutaline or 0.3 cc epinephrine.
  - h) If unresponsive to other treatments and in impending respiratory failure, may consider magnesium sulfate 25 mg/kg IV.
  - i) If patient ET intubated and becomes agitated from increased level of consciousness, may give either:
    - Versed .1 mg/kg titrated up to 1mg IV, IM, or SC. May repeat
  - j) Expedite transport.
  - k) Consider Atropine {0.1 mg/cc}. Give 0.02 mg/kg or 0.2 cc/kg IV/IO up to 5 cc for child or 10 cc for adolescent (minimum dose 0.1 mg or 1 cc). May be repeated once in 5 minutes.
  - l) Consider Na bicarbonate {1 mEq/cc} if arrest interval long or upon return of spontaneous circulation after prolonged resuscitation.
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## B. FOREIGN BODY:

### Standing Orders:

1. If the patient is making efforts to clear the airway without success, you may assist with careful back blows (infants only), chest or gentle abdominal compressions (per BCLS Protocols) - avoid abdominal compressions in infants less than one year old. Synchronize with patient's cough.
2. If the patient has lost consciousness, attempt to open the airway (use moderate extension and jaw-lift) and ventilate. Reposition and attempt ventilation again if necessary. If unsuccessful, perform standard obstructed airway maneuvers for infant, child or adult, as appropriate. Position an infant with the head dependent during back blows and chest compressions.
3. Consider direct laryngoscopy and foreign body removal with Magill forceps.
4. If unable to remove by any method, attempt to blow obstruction past the trachea with mouth-to-mask ventilation. Attempt endotracheal intubation if authorized.
5. Transport early. Contact medical control physician promptly for further orders.

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(Airway Emergencies continued next page)

## AIRWAY EMERGENCIES (Continued)

STANDING ORDERS	AFTER OBTAINING VERBAL ORDERS
<p><b>C. <u>CROUP AND EPIGLOTTITIS:</u></b></p> <ol style="list-style-type: none"> <li>1. Keep patient upright at all times when conscious.</li> <li>2. Begin oxygen therapy. Remove mask if not well tolerated.</li> <li>3. <b>If child is unconscious, position supine and begin ventilation.</b></li> <li>4. Place ECG leads.</li> <li>5. Transport early.</li> <li>6. Contact med control physician as soon as possible if epiglottitis is suspected or distress is marked.</li> </ol>	<ol style="list-style-type: none"> <li>7. Consider 5 mg nebulized epinephrine 1:1000 for suspected croup. If unable to neb, may give epinephrine 1:1000 0.01 mg/kg SC.</li> </ol>
<p><b>PART IV. STATUS SEIZURES</b></p> <ol style="list-style-type: none"> <li>1. Assure patent airway. Begin oxygen therapy.</li> <li>2. Obtain history: Time of onset, history of previous seizures, other risk factors such as previous trauma, illness, or drugs.</li> <li>3. If seizure ongoing &gt;5 minutes and IV access already established, give midazolam HCL (Versed) 0.1 mg/kg IV over two minutes. (maximum dose = 5 mg)</li> <li>4. If seizure ongoing &gt;5 minutes and no IV access, give midazolam HCL (Versed) 0.2 mg/kg IM prior to starting IV. (maximum dose = 7 mg)</li> <li>5. Contact med control physician for further orders.</li> </ol>	<ol style="list-style-type: none"> <li>6. If seizure not terminated within 10 minutes after Versed, give additional 0.05 mg/kg Versed over two minutes. (max dose = 2.5 mg). Be prepared to support respirations.</li> </ol>

STANDING ORDERS	AFTER OBTAINING VERBAL ORDERS
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**PART V. ANAPHYLAXIS**

1. Begin oxygen therapy; assist respirations with PPV as needed; ET intubate, if authorized, for severe respiratory distress and/or ineffective ventilation.
2. Consider placing venous tourniquet proximal to sting or injection site and/or ice pack at sting or injection site.
3. May administer epinephrine 1:1000, 0.01 mg/kg (0.01 cc/kg) SC or IM up to 0.3 cc if patient was exposed to commonly recognized allergen and has respiratory distress OR hypotension.
4. Obtain IV access and hang N.S.
5. If patient meets criteria in #3 above, may administer diphenhydramine HCL (Benadryl) 1 mg/kg IV while contacting med control physician. (maximum dose = 25 mg)
7. Transport early.

6. If patient ET intubated and becomes agitated from increased level of consciousness, may give either:
  - Versed .1 mg/kg titrated up to 1mg IV, IM, or SC. May repeat
8. Consider fluid bolus - 20 cc/kg.

**PART VI. DRUG INGESTION OR OVERDOSE**

1. Begin oxygen therapy if child obtunded.
2. Tricyclic O.D.'s requiring ventilatory support should be hyperventilated.
3. For all significant overdoses, obtain IV access and contact med control physician for orders.
4. For all suspected tricyclic overdoses, also monitor ECG.

5. Consider Narcan 0.1 mg/kg IM or IV up to 2 mg.
6. Consider Na Bicarbonate 1 mEq/kg IV for tricyclic ingestions.
7. If child unconscious and blood glucose <60 mg/dl, consider D<sub>50</sub>W 1 cc/kg IV up to 50 cc for patients four years or older. For patients three years or younger, use D<sub>25</sub>W, 2 cc/kg.

**PART VII. UNCONSCIOUS - UNKNOWN ETIOLOGY**

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|--|---|
| <ol style="list-style-type: none"> <li>1. Begin oxygen therapy.</li> <li>2. Obtain available history.</li> <li>3. Immobilize spine if trauma is possible.</li> <li>4. Obtain IV access - <b>Transport early if no IV site available.</b></li> <li>5. Attempt to obtain blood sample for reading by blood glucose determination device.</li> <li>6. Contact med control physician.</li> </ol> | <ol style="list-style-type: none"> <li>7. If blood glucose &lt;60 mg/dl, may give D<sub>50</sub>W, 1 cc/kg IV up to 50 cc to patients <b>four</b> years or older. For patients <b>three</b> years or younger, use D<sub>25</sub>W, 2 cc/kg.</li> <li>8. Consider Narcan 0.1 mg/kg IM or IV up to 2 mg.</li> </ol> |
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**PART VIII. SYMPTOMATIC KNOWN DIABETIC:**

1. **If patient is conscious, cooperative, and able to swallow effectively, give oral glucose therapy.**
2. If patient unable to take oral fluids due to altered level of consciousness:
  - a) Obtain IV access.
  - b) May use blood glucose determination device to confirm clinical suspicion.
  - c) Give D<sub>50</sub>W, 1 cc/kg up to 50 cc to patients **four** years or older. For patients **three** years or younger, use D<sub>25</sub>W, 2 cc/kg IV.
  - d) May give glucagon 1 mg IM if IV access difficult or impossible.
3. Contact med control physician for:
  - a) patients with poor response to glucose administration;
  - b) all patients refusing transport following response to treatment with oral glucose or parenteral meds.

## PART VIII. PEDIATRIC SHOCK:

**Signs/Symptoms:** Cool skin, poor capillary refill, tachycardia, weak peripheral pulses, low BP, altered mental status.

### STANDING ORDERS FOR ALL PEDIATRIC SHOCK

1. Perform primary survey. Perform secondary survey while obtaining history.
2. If trauma, immobilize head and spine.
3. Begin oxygen therapy.
4. Place patient in appropriate size pneumatic compression trousers (PCT) (uninflated) whenever symptoms of shock are present, i.e., cool skin, poor capillary refill, tachycardia, etc.
  - Do **not** inflate without verbal order if patient has chest injury or penetrating injury to the neck;
  - For other patients with traumatic shock, inflate PCT if SBP is less than lower limit for age (see chart below);
  - For all other hemorrhagic and non-hemorrhagic conditions, begin transport and contact med control physician en route for orders regarding PCT inflation.
5. Begin transport prior to any other ALS intervention. Position in Trendelenburg if hypotensive.
6. Apply ECG leads after quick-look to establish rhythm.
7. En route obtain IV access and hang N.S. using macrodrip infusion set. If IV not possible, may attempt IO access (if authorized). Contact med control physician for infusion rate; recommended initial bolus = 20 cc/kg (10 cc/lb).

#### **Blood Pressure Guidelines:**

<u>Age</u>	<u>Systolic BP Lower Limit</u>
6 mos.	70
2 yrs.	80
4 yrs.	80
6 yrs.	80
8 yrs.	85
10 yrs. & older	90

#### **PCT Guidelines:**

##### **SIZE:**

- >100 lbs: use adult pneumatic compression trousers
- 40-100 lbs: use pediatric PCT
- 20-40 lbs: use toddler PCT ( optional equipment)

##### **PRECAUTIONS:**

- Use the lowest effective pressure when inflating PCT.
- Do not apply the abdominal compartment above mid-abdomen on any pediatric patient.
- Monitor adequacy of ventilation carefully whenever the abdominal compartment is inflated.
- Prepare to suction vomitus when abdominal compartment is inflated.

## PART IX. CARDIAC EMERGENCIES

### A. BRADYARRHYTHMIAS:

Heart Rate Lower Limits for Age	
<u>Age</u>	<u>Heart Rate</u>
< 2	80
2	80
4	75
6	70
8	60

STANDING ORDERS	AFTER OBTAINING VERBAL ORDERS
<ol style="list-style-type: none"> <li>1. Assure adequate airway and ventilation.</li> <li>2. Perform chest compressions if heart rate &lt;80/min. in an infant or &lt;60/min. in a child after 15-30 seconds of adequate ventilation.</li> <li>3. If evidence of hypotension, poor perfusion or respiratory difficulty, attempt IV access and hang N.S. If IV not possible, attempt IO access (if authorized).</li> <li>4. Contact med control physician.</li> </ol>	<p style="text-align: center;">{ } = drug concentration</p> <ol style="list-style-type: none"> <li>5. Epinephrine 1:10,000 <b>{0.1 mg/cc}</b>. Give 0.01 mg/kg or 0.1 cc/kg IV/IO up to 10 cc.</li> <li>6. Atropine <b>{0.1 mg/cc}</b>. Give 0.02 mg/kg or 0.2 cc/kg IV/IO/ET up to 5 cc for child or 10 cc for adolescent (minimum dose 0.1 mg or 1 cc). May be repeated once in 5 minutes.</li> <li>7. Consider transcutaneous pacing if available and patient unconscious (See Appendix H).</li> </ol>

**B. CARDIAC ARREST STATES:**

**General Guidelines:**

- Most cardiac arrest states in children are the result of a primary respiratory disorder.
- The following protocols outline interventions for cardiac arrest based on the patient's ECG rhythm. Sections of more than one protocol may need to be utilized for the patient who changes ECG rhythms during the course of resuscitation.
- If at any time during resuscitation a patient develops ventricular fibrillation, the VF/VT protocol should be initiated.
- After multiple rhythm changes and appropriate standing order interventions, medical control physician contact should be established.
- In the absence of extenuating circumstances, medical control contact should be made prior to transporting a patient in continued arrest.

STANDING ORDERS	AFTER OBTAINING VERBAL ORDERS
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**1. Asystole and Pulseless Electrical Activity (PEA)**

- a) Institute or continue CPR.
- b) For pulseless electrical activity (PEA), look for underlying treatable cause such as hypovolemia, tension pneumothorax, hypoxia, hypothermia, drug ingestion.
- c) Assure best possible oxygenation and ventilation. ET intubate (if authorized) or insert EOA or Combitube if patient is appropriate size.
- d) Obtain IV access and hang N.S. If IV not possible, attempt IO access (if authorized).

NOTE: If drug dosage calculation is difficult, contact med control physician for orders. If not, proceed with drug standing orders below.

{ } = drug concentration

e) Initial epinephrine

IV/IO: 1:10,000 {0.1 mg/cc}  
 Give 0.01 mg/kg or 0.1 cc/kg up to 10 cc;  
 or  
 ET: 1:1000 {1 mg/cc}  
 Give 0.1 mg/kg or 0.1 cc/kg up to 10 cc.

f) Repeat epinephrine 1:1000 {1 mg/cc}.  
 Give 0.1-0.2 mg/kg or 0.1-0.2 cc/kg IV/IO/ET up to 20 cc. Repeat every 3-5 min.

g) Consider Na bicarbonate {1 mEq/cc} if arrest interval long or upon return of spontaneous circulation after prolonged resuscitation. Give 1 mEq/kg or 1 cc/kg IV/IO up to 50 cc.

STANDING ORDERS	AFTER OBTAINING VERBAL ORDERS
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**2. Ventricular Fibrillation/Ventricular Tachycardia**

- a) Institute or continue CPR.
- b) Assure best possible oxygenation and ventilation. ET intubate (if authorized) or insert EOA or Combitube if patient appropriate size.
- c) If rhythm unchanged by oxygenation and ventilation, defibrillate up to 3 times at:
  - #1 – 2 joules/kg
  - #2 – 4 joules/kg
  - #3 – 4 joules/kg
 (See weight chart on page 3)
- d) Obtain IV access and hang N.S. If IV not possible, attempt IO access (if authorized). Transport early if no readily accessible IV/IO access.

NOTE: If drug dosage calculation is difficult, contact med control physician for orders. If not, proceed with drug standing orders below.

{ } = drug concentration

- e) Initial epinephrine:
  - IV/IO: 1:10,000 **{0.1 mg/cc}**
  - Give 0.01 mg/kg or 0.1 cc/kg up to 10 cc;
  - or
  - ET: 1:1000 **{1 mg/cc}**
  - Give 0.1 mg/kg or 0.1 cc/kg up to 10 cc.
- f) Repeat defibrillation as indicated at 4 joules/kg up to 360 joules.
- g) If V-fib persists, administer Lidocaine **{10 mg/cc}**. Give 1 mg/kg or 0.1 cc/kg IV/IO/ET.
- h) Defibrillate at 4 joules/kg up to 360 joules.

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STANDING ORDERS	AFTER OBTAINING VERBAL ORDERS
	<p>i) Consider additional drugs followed by defibrillation attempts at 4J/kg:</p> <ul style="list-style-type: none"> <li>• Epinephrine – 1:1000 <b>{1 mg/cc}</b> Give 0.1 – 0.2 mg/kg or 0.1 – 0.2 cc/kg IV/IO/ET. Repeat every 3-5 min.</li> <li>• Lidocaine <b>{10 mg/cc}</b>. Give 1 mg/kg or 0.1 cc/kg IV/IO/ET. Repeat every 3-5 min. X2;</li> <li>• Bretylium <b>{50 mg/cc}</b>. Give 5 mg/kg or 0.1 cc/kg IV/IO initially. Give 10 mg/kg or 0.2 cc/kg IV/IO for second dose in 5 minutes.</li> </ul> <p>j) Consider Na bicarbonate <b>{1 mEq/cc}</b> if arrest interval long or upon return of spontaneous circulation after prolonged arrest. Give 1 mEq/kg or 1 cc/kg IV up to 50 cc.</p>