



Childbirth/ Labor

History

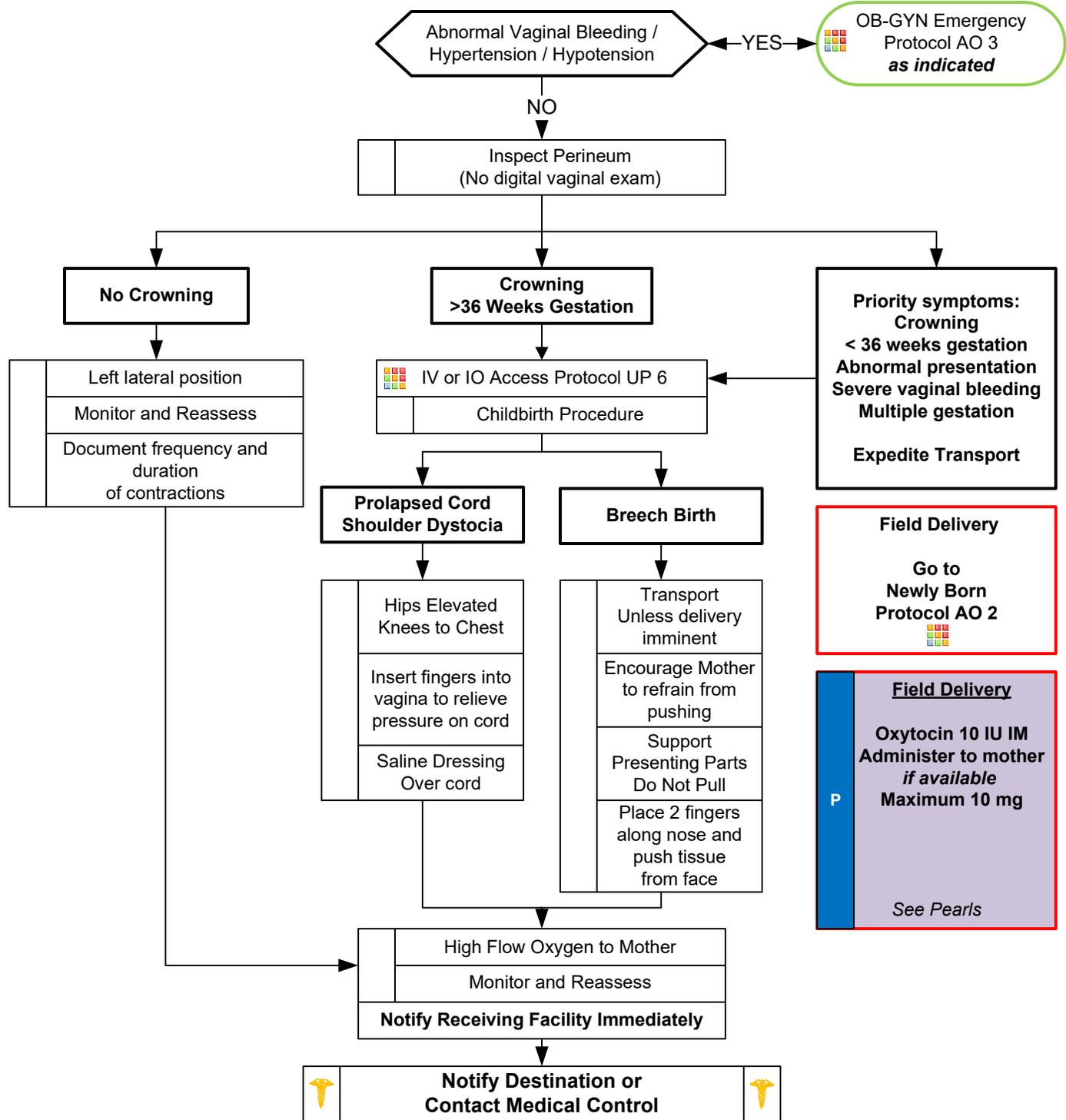
- Due date
- Time contractions started / how often
- Rupture of membranes
- Time / amount of any vaginal bleeding
- Sensation of fetal activity
- Past medical and delivery history
- Medications
- Gravida / Para Status
- High Risk pregnancy

Signs and Symptoms

- Spasmodic pain
- Vaginal discharge or bleeding
- Crowning or urge to push
- Meconium

Differential

- Abnormal presentation
 - Buttock
 - Foot
 - Hand
- Prolapsed cord
- Placenta previa
- Abruptio placenta



Field Delivery

Go to Newly Born Protocol AO 2

Field Delivery

Oxytocin 10 IU IM Administer to mother if available Maximum 10 mg

See Pearls



Childbirth/ Labor

Apgar score			
	Score 2	Score 1	Score 0
A	 Pink	 Extremities blue	 Pale or blue
P	> 100 bpm	< 100 bpm	No pulse
G	Cries and pulls away	Grimaces or weak cry	No response to stimulation
A	 Active movement	 Arms, legs flexed	 No movement
R	Strong cry	Slow, irregular	No breathing

Pearls

- **Recommended Exam (of Mother): Mental Status, Heart, Lungs, Abdomen, Neuro**
- **Record APGAR at 1 minute and 5 minutes after birth. Do not delay resuscitation to obtain APGAR.**
- **If neonate requiring resuscitation, move quickly to AO 2 Newly Born Protocol**
- **After delivery, massaging the uterus (lower abdomen) will promote uterine contraction and help to control post-partum bleeding (apply uterine massage only after placenta delivery).**
- **Postpartum hemorrhage:**
 - **Pitocin (Oxytocin):**
Following field delivery, where available, administer 10 IU IM to promote uterine contraction and decrease postpartum hemorrhage.
Agencies may administer via IV or IO route per local agency medical director.
 - **Tranexamic Acid (TXA):**
Administer when postpartum hemorrhage is associated with signs and symptoms of shock.
CONTRAINDICATED where birth occurs > 3 hours prior to EMS arrival.
- **Transport or Delivery?**
Decision to transport versus remain and deliver is multifactorial and difficult. Generally it is preferable to transport.
Factors that will impact decision include: number of previous deliveries; length of previous labors; frequency of contractions; urge to push; and presence of crowning.
- **Maternal positioning for labor:**
Supine with head flat or elevated per mother's choice. Maintain flexion of both knees and hips. Elevated buttocks slightly with towel. If delivery not imminent, place mother in the left, lateral recumbent position with right side up about 10 – 20°.
- **Umbilical cord clamping and cutting:**
Place first clamp about 10 cm from infant's abdomen and second clamp about 5 cm away from first clamp. In preterm **neonates born < 37 weeks** of gestation who do not to require immediate resuscitation, defer umbilical cord clamping for at least 60 seconds.
- **Multiple Births:**
Twins occur about 1/90 births. Typically manage the same as single gestation. If imminent delivery call for additional resources, if needed. Most twins deliver at about 34 weeks so lower birth weight and hypothermia are common. Twins may share a placenta so clamp and cut umbilical cord after first delivery. Notify receiving facility immediately.
- Document all times (Contraction onset, contraction duration and frequency, delivery, APGAR 1 and 2, and placenta delivery).
- If maternal seizures occur, refer to the Obstetrical Emergencies Protocol.
- Some perineal bleeding is normal with any childbirth. Large quantities of blood or free bleeding are abnormal.



Newly Born

History

- Due date and gestational age
- Multiple gestation (twins etc.)
- Meconium / Delivery difficulties
- Congenital disease
- Medications (maternal)
- Maternal risk factors such as substance abuse or smoking

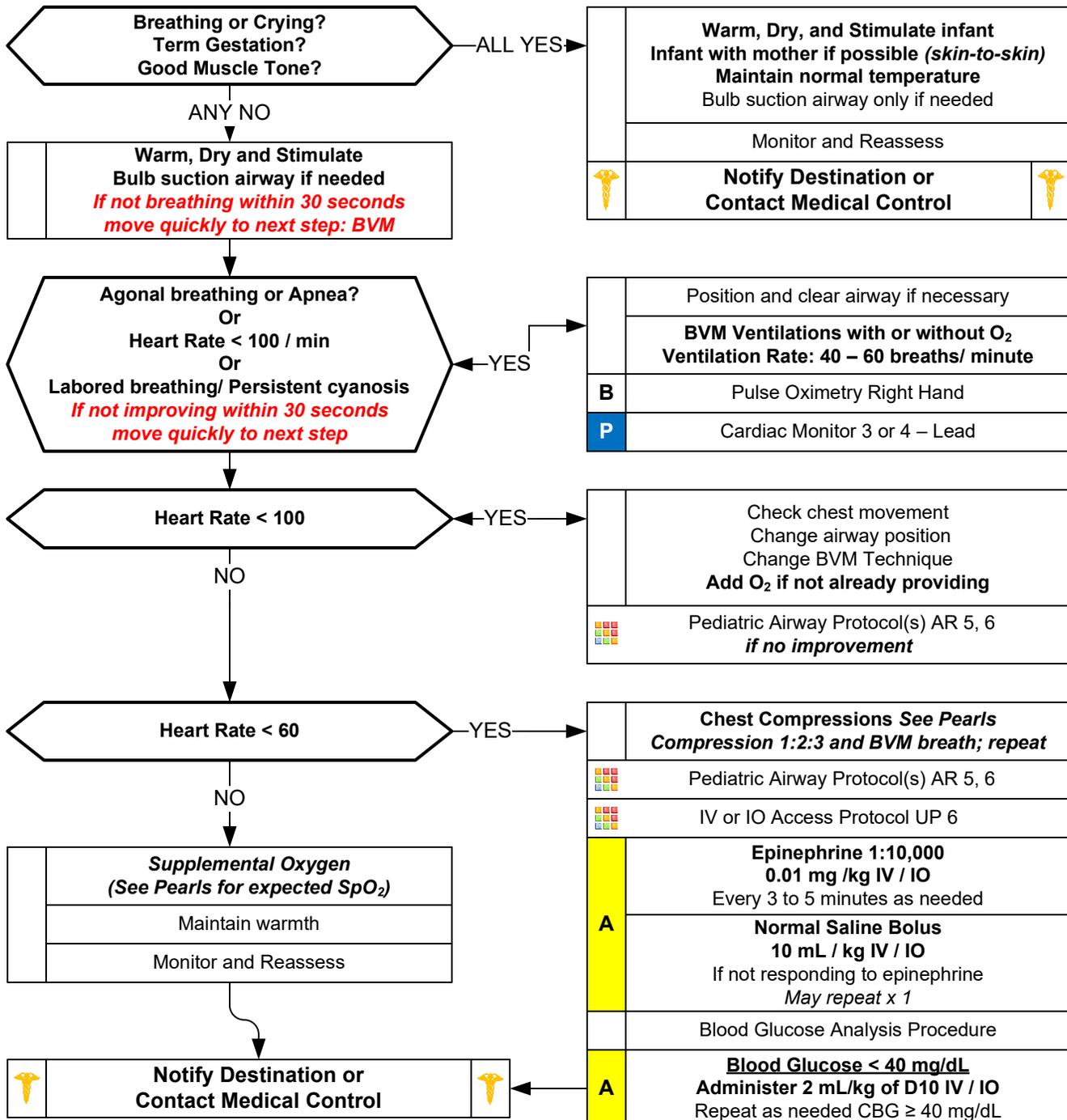
Signs and Symptoms

- Respiratory distress
- Peripheral cyanosis or mottling (normal)
- Central cyanosis (abnormal)
- Altered level of responsiveness
- Bradycardia

Differential

- Airway failure, Secretions, or Respiratory drive
- Infection
- Maternal medication effect
- Hypovolemia, Hypoglycemia, Hypothermia
- Congenital heart disease

In a non-vigorous infant whose respirations are not improving after warming, drying, and stimulating within 30 seconds, move quickly to Positive Pressure Ventilation with BVM





Newly Born

Oxygen Sat's Immediate after childbirth are low till the ductus arteriosus closes – see below

Immediate Post Child Birth, Newborns may have a blood sugar less than 40 mg/dl.

Active warming and stimulation will often increase blood sugar. Bloodsugar should be between 40-70 at the 5 minute mark. If less than 40 after active warming and stimulation consider D10

Pearls

- Recommended Exam: Quality of Cry, Muscle tone, Respirations, Heart Rate, Pulse Oximetry, and Gestational Age**
- Majority of newborns do not require resuscitation, only warming, drying, stimulating, and cord clamping.**
 - With term gestation, strong cry/ breathing, and good muscle tone, generally will not need resuscitation.
 - If no resuscitation needed, skin-to-skin contact with the mother is best way to maintain warmth of infant.
 - Maintain warmth of infant following delivery adjuncts; cap/ hat, plastic wrap, thermal mattress, radiant heat.
 - Most important vital signs in the newly born are heart rate, respirations, and respiratory effort.
 - About 10% of newborns need assistance to help them start breathing after birth.
 - About 1% of newborns require intensive resuscitation to restore/ support cardiorespiratory functions.
- Airway:**
 - Positive Pressure Ventilations with BVM is the most important treatment in a newborn with poor respirations and/ or persistent bradycardia (HR < 100 BPM).**
 - When BVM is needed, ventilation rate is 40 – 60 breaths per minute.
 - Adequacy of ventilation/ is measured mainly by increase in heart rate as well as chest rise.
 - If heart rate or respirations are not improving after 30 to 60 seconds of resuscitation, place BIAD or endotracheal tube.
 - Routine suctioning is no longer recommended, bulb suction only if needed.
- Breathing:**
 - Oxygen is not necessary initially, but if infant is not responding with increased heart rate or adequate breathing, add oxygen to the BVM.
- Circulation/ Compressions:**
 - Heart rate is critical during first few moments of life and is best monitored by 3 or 4 lead ECG, as pulse assessment is difficult in the neonate. Heart Rate is best tool for gauging resuscitation success.
 - If heart rate remains < 60 BPM after 30 to 60 seconds of BVM/ resuscitation, begin compressions.
 - With BIAD or ETT in place, compressions and ventilation should be coordinated with compression, compression, compression, then ventilation. (3:1 ratio with all events totaling 120 per minute)
 - 2-thumbs encircling chest and supporting the back is recommended. Limit interruptions of chest compressions.
- If infant not responding to BVM, compressions, and/ or epinephrine, consider hypovolemia, pneumothorax, and/ or hypoglycemia (< 40 mg/dL).
- Document 1 and 5 minute APGAR in PCR or ePCR. DO NOT delay or interrupt resuscitation to obtain an APGAR score.
- Meconium staining:**
 - Infant born through meconium staining who is NOT vigorous:**
 - Bulb suction mouth and nose and provide positive pressure ventilation.
 - Direct endotracheal suctioning is no longer recommended.
- Expected Pulse Oximetry readings following birth:**

(Accurate only in infant NOT requiring resuscitation)

1 minute	60 – 65%
2 minutes	65 – 70%
3 minutes	70 – 75%
4 minutes	75 – 80%
5 minutes	80 – 85%
10 minutes	85 – 95%
- Pulse oximetry should be applied to the right upper arm, wrist, or palm.
- Cord clamping:**
 - Recommended to delay for 1 minute, unless infant requires resuscitation.
- Maternal sedation or narcotics will sedate infant (Naloxone NO LONGER recommended, use supportive care only).
- D10 = D50 diluted (1 ml of D50 with 4 ml of Normal Saline) or **D10 solution at 2 mL/kg IV / IO.**
- In the NEONATE, D10 is administered at 2 mL/kg. (NOT 5 mL/kg in the pediatric patient after the first month of life.)**

Apgar score

	Score 2	Score 1	Score 0
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P ulse	> 100 bpm	< 100 bpm	No pulse
G rimace	Cries and pulls away	Grimaces or weak cry	No response to stimulation
A ctivity	 Active movement	 Arms, legs flexed	 No movement
R espiration	Strong cry	Slow, irregular	No breathing



OB-GYN Emergency

History

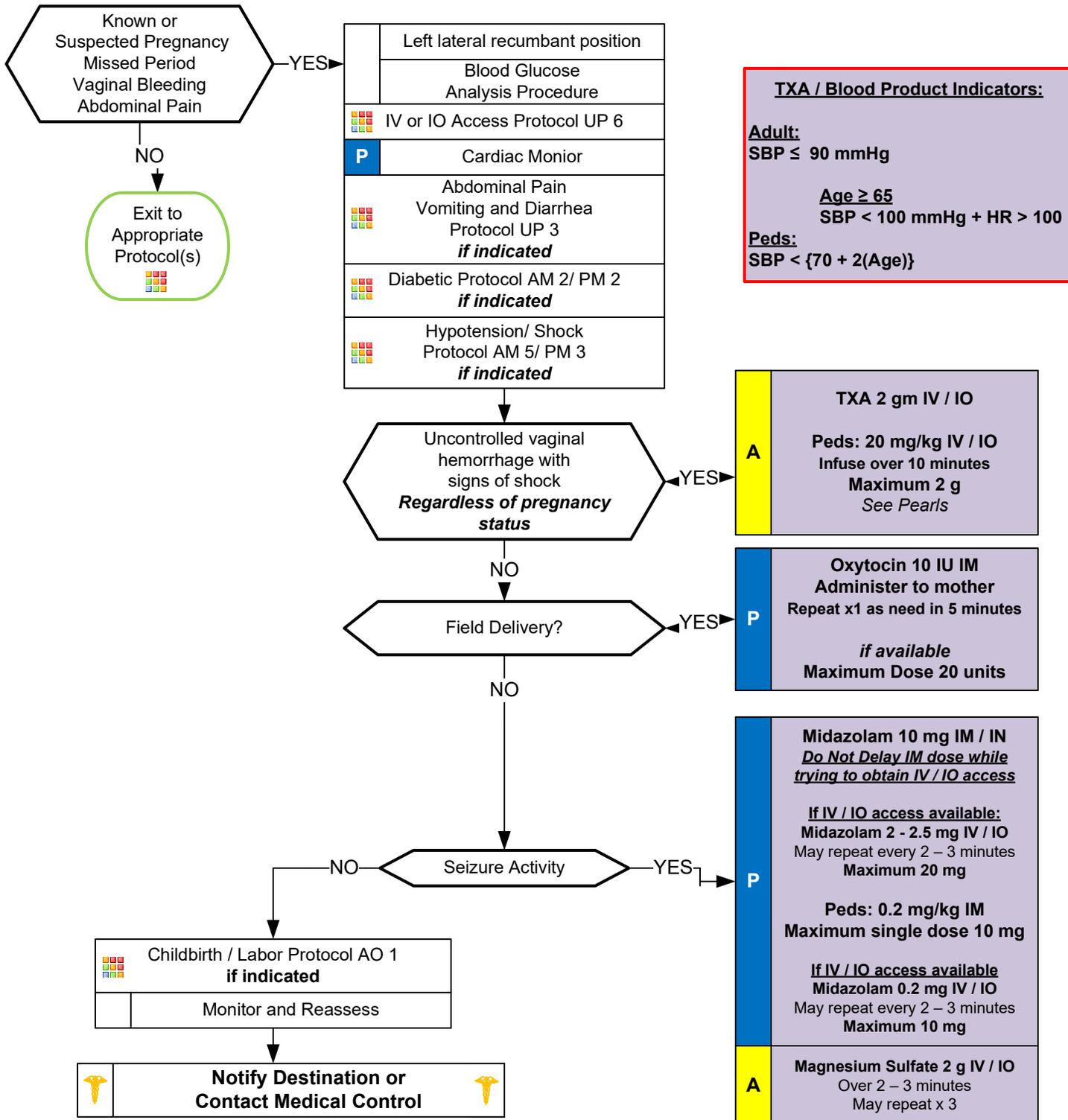
- Past medical history
- Hypertension meds
- Prenatal care
- Prior pregnancies / births
- Gravida / Para

Signs and Symptoms

- Vaginal bleeding
- Abdominal pain
- Seizures
- Hypertension
- Severe headache
- Visual changes
- Edema of hands and face

Differential

- Pre-eclampsia / Eclampsia
- Placenta previa
- Placenta abruptio
- Spontaneous abortion



TXA / Blood Product Indicators:

Adult:
 SBP ≤ 90 mmHg

Age ≥ 65
 SBP < 100 mmHg + HR > 100

Peds:
 SBP < {70 + 2(Age)}

A

TXA 2 gm IV / IO

Peds: 20 mg/kg IV / IO
 Infuse over 10 minutes
 Maximum 2 g
 See Pearls

P

Oxytocin 10 IU IM
 Administer to mother
 Repeat x1 as need in 5 minutes

if available
 Maximum Dose 20 units

P

Midazolam 10 mg IM / IN
Do Not Delay IM dose while trying to obtain IV / IO access

If IV / IO access available:
 Midazolam 2 - 2.5 mg IV / IO
 May repeat every 2 - 3 minutes
 Maximum 20 mg

Peds: 0.2 mg/kg IM
 Maximum single dose 10 mg

If IV / IO access available
 Midazolam 0.2 mg IV / IO
 May repeat every 2 - 3 minutes
 Maximum 10 mg

A

Magnesium Sulfate 2 g IV / IO
 Over 2 - 3 minutes
 May repeat x 3



OB-GYN Emergency

Please Note: Midazolam dosage is less than traditional seizures. This is because respiratory depression and hypotension are far more dangerous to the mother and baby.

Unless prior epilepsy history, the etiology of eclamptic seizures are more appropriately treated with lower dose benzodiazepines and repeat doses of Magnesium.

Clarification: Midazolam is 1st Dose Med in Suspected Eclamptic Seizures + Magnesium is immediately given after the Midazolam. Repeat both medications every 2-3 minutes. Max Adult Midazolam 20mg, Max dose Magnesium 8mg

Pearls

- **Recommended Exam: Mental Status, Abdomen, Heart, Lungs, Neuro**
- **With active seizure activity, benzodiazepine is a priority over magnesium sulfate.**
- **Midazolam 5 – 10 mg IM is effective in termination of seizures. Do not delay IM administration with difficult or no IV or IO access.**
- **Magnesium Sulfate should be administered as quickly as possible. May cause hypotension and decreased respiratory drive, but more likely in doses higher than 6 gm.**
- **Any pregnant patient involved in a MVC should be seen immediately by a physician for evaluation. Greater than 20 weeks generally require 4 to 6 hours of fetal monitoring. DO NOT suggest the patient needs an ultrasound but emphasize patient needs 4 to 6 hours of fetal monitoring.**
- **After delivery, massaging the uterus (lower abdomen) will promote uterine contraction and help to control post-partum bleeding (apply uterine massage only after placenta delivery).**

• Postpartum or Vaginal hemorrhage:

Pitocin (Oxytocin):

Following field delivery, where available, administer 10 IU IM to promote uterine contraction and decrease postpartum hemorrhage.

Agencies may administer via IV or IO route per local agency medical director.

Tranexamic Acid (TXA):

Administer when postpartum hemorrhage is associated with signs and symptoms of shock. **CONTRAINDICATED** where birth occurs > 3 hours prior to EMS arrival.

Vaginal hemorrhage unrelated to pregnancy, administer with signs and symptoms of shock.

• Ectopic pregnancy:

Implantation of fertilized egg outside the uterus, commonly in or on the fallopian tube. As fetus grows, rupture may occur. Vaginal bleeding may or may not be present. Many women with ectopic pregnancy do not know they are pregnant. Usually occurs within 5 to 10 weeks of implantation. Maintain high index of suspicion with women of childbearing age experiencing abdominal pain.

• Preeclampsia:

Occurs in about 6% of pregnancies. Defined by hypertension and protein in the urine. RUQ pain, epigastric pain, N/V, visual disturbances, headache, and hyperreflexia are common symptoms.

In the setting of pregnancy, hypertension is defined as a BP > 140 systolic or > 90 diastolic mmHg, or a relative increase of 30 systolic and 20 diastolic from the patient's normal (pre-pregnancy) blood pressure.

Risk factors: < 20 years of age, first pregnancy, multi-gestational pregnancy, gestational diabetes, obesity, personal or family history of gestational hypertension.

• Eclampsia:

Seizures occurring in the context of preeclampsia. Remember, women may not have been diagnosed with preeclampsia.

- Maintain patient in a left lateral position, right side up 10 - 20° to minimize risk of supine hypotensive syndrome.
- Ask patient to quantify bleeding - number of pads used per hour.



Pediatric Asystole / PEA

History

- Events leading to arrest
- Estimated downtime
- SAMPLE
- Existence of terminal illness
- Airway obstruction
- Hypothermia
- Suspected abuse

Signs and Symptoms

- Pulseless
- Apneic
- No electrical activity on ECG
- No heart tones on auscultation

Differential

- Respiratory failure
- Foreign body
- Infection (croup, epiglottitis)
- Congenital heart disease
- See Reversible Causes below

Pediatric Pulseless Arrest Protocol

Criteria for Death / No Resuscitation Review DNR / MOST Form

YES →

NO ↓

Decomposition
Rigor mortis
Dependent lividity
Blunt force trauma
Injury incompatible with life
Extended downtime with asystole

Do not begin resuscitation

Follow Deceased Persons Policy

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol

	<p>Begin Continuous CPR Compressions Push Hard (≥ 1/3 AP Diameter of Chest) (1.5 inches Infant / 2 inches in Children) Push Fast (100 - 120 / min) Change Compressors every 2 minutes (sooner if fatigued) <i>(Limit changes / pulse checks ≤ 10 seconds)</i></p> <p>Ventilation rate: 1 breath every 2 seconds when age < 1 1 breathe every 3 seconds when age ≥ 1 15:2 Compression:Ventilation if no Advanced Airway</p>
	AED Procedure <i>if available</i>
P	Cardiac Monitor
	IV or IO Access Protocol UP 6
A	<p>Epinephrine 1:10,000 0.01 mg/kg IV / IO Maximum Single Dose 1mg -or- Epinephrine 1:1000 0.1 mg / kg IM Maximum Single Dose 1mg Repeat every 3 – 5 minutes x 3 total doses</p>
	<p>Normal Saline Bolus 20 mL/kg IV / IO May repeat as needed Maximum 60 mL/kg</p>
	Search for Reversible Causes
	Blood Glucose Analysis Procedure <i>if applicable</i>

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia

Tension pneumothorax
Tamponade; cardiac
Toxins
Thrombosis; pulmonary (PE)
Thrombosis; coronary (MI)

Notify Destination or Contact Medical Control



Pediatric Asystole / PEA

Priorities:

- Immediate Initiation of high quality CPR & rhythm interpretation.
- Rapid (Early) administration of intramuscular, IV, IO Epinephrine
- Goal is to work the code in place and minimize all movement to maximize highest quality CPR
- Minimum 10 minute cool down time after obtaining ROSC.
- Airway and Hemodynamics high priority Post-ROSC

3 total doses of Code Epinephrine per encounter – may use Push Epi or Epi drip for ROSC

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks.**
- **Refer to optional protocol AC 11 or development of local agency protocol.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated. Compress $\geq 1/3$ anterior-posterior diameter of chest, in infants 1.5 inches and in children 2 inches.**
- **Majority of pediatric arrests stem from a respiratory insult or hypoxic event. Compressions should be coupled with ventilations.**
- **When advanced airway not in place perform 15 compressions with 2 ventilations.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **DO NOT HYPERVENTILATE:**
If advanced airway in place ventilate:
Age < 1 year: 1 breath every 2 seconds with continuous, uninterrupted compressions.
Age ≥ 1 year: 1 breath every 3 seconds with continuous, uninterrupted compressions.
- **Airway is a more important intervention in pediatric arrests. This should be accomplished quickly with BVM or BIAD.**
- **Patient survival is often dependent on proper ventilation and oxygenation / airway Interventions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **High-Quality CPR:**
Make sure chest compressions are being delivered at 100 – 120 / min.
Make sure chest compressions are adequate depth for age and body habitus.
Make sure you allow full chest recoil with each compression to provide maximum perfusion.
Minimize all interruptions in chest compressions to < 10 seconds.
Use AED or apply ECG monitor / defibrillator as soon as available.
- **Defibrillation:** Follow manufacture's recommendations concerning defibrillation / cardioversion energy when specified.
- **End Tidal CO₂ (EtCO₂)**
If EtCO₂ is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
If EtCO₂ spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **IV / IO access and drug delivery are secondary to high-quality chest compressions and early defibrillation.**
- **IV access is preferred route. Follow IV or IO Access Protocol UP 6.**
- **Special Considerations**
Maternal Arrest - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. Place mother supine and perform Manual Left Uterine Displacement moving uterus to the patient's left side. IV/IO access preferably above diaphragm.
Defibrillation is safe at all energy levels.
Renal Dialysis / Renal Failure - Refer to Dialysis / Renal Failure Protocol AM 3 caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.
Opioid Overdose - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol UP 7 while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.**



Pediatric Bradycardia With a Pulse

History

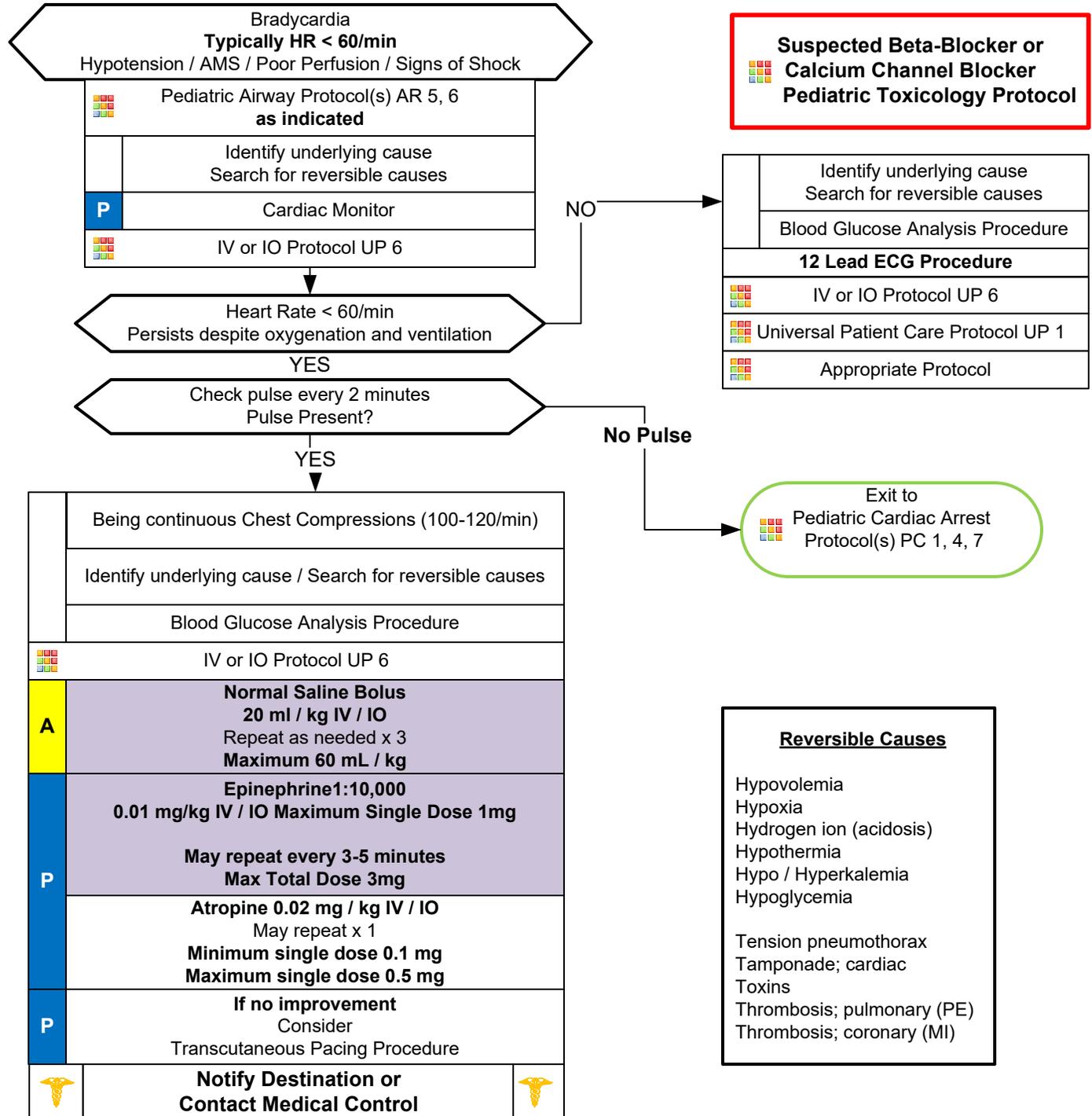
- Past medical history
- Foreign body exposure
- Respiratory distress or arrest
- Apnea
- Possible toxic or poison exposure
- Congenital disease
- Medication (maternal or infant)

Signs and Symptoms

- Decreased heart rate
- Delayed capillary refill or cyanosis
- Mottled, cool skin
- Hypotension or arrest
- Altered level of consciousness

Differential

- Respiratory failure, Foreign body, Secretions, Infection (croup, epiglottitis)
- Hypovolemia (dehydration)
- Congenital heart disease
- Trauma
- Tension pneumothorax
- Hypothermia
- Toxin or medication
- Hypoglycemia
- Acidosis





Pediatric Bradycardia With Poor Perfusion

Pearls

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Bradycardia is often associated with hypoxia so insure patent airway, breathing, and circulation as needed.**
- **Begin CPR immediately with persistent bradycardia and poor perfusion despite adequate oxygenation and ventilation.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **Rhythm should be interpreted in the context of symptoms and pharmacological treatment given only when symptomatic, otherwise monitor and reassess.**
- **Consider hyperkalemia with wide complex, bizarre appearance of QRS complex, and bradycardia.**
- **12-Lead ECG:**
 - **12 Lead ECG not necessary to diagnose and treat**
 - **Obtain when patient is stable and/or following rhythm conversion.**
- **Unstable condition**
 - **Condition which acutely impairs vital organ function and cardiac arrest may be imminent.**
 - **If at any point patient becomes unstable move to unstable arm in algorithm**
- **Epinephrine is first drug choice for persistent, symptomatic bradycardia.**
- **Atropine:**
 - **Second choice, unless there is evidence of increased vagal tone or a primary AV conduction block, then give atropine first.**
 - **Ineffective and potentially harmful in cardiac transplantation. May cause paradoxical bradycardia.**
- **Symptomatic bradycardia causing shock or peri-arrest condition:**
 - **If no IV or IO access immediately available, start Transcutaneous Pacing, establish IV / IO access, and then administer epinephrine.**
 - **Epinephrine should be administered followed Atropine if no response.**
- **Symptomatic condition**
 - **Arrhythmia is causing symptoms such as palpitations, lightheadedness, or dyspnea, but cardiac arrest is not imminent.**
 - **Symptomatic bradycardia usually occurs at rates < 50 beats per minute.**
 - **Search for underlying causes such as hypoxia or impending respiratory failure.**
- **Serious Signs / Symptoms:**
 - **Hypotension. Acutely altered mental status. Signs of shock / poor perfusion. Chest pain with evidence of ischemia (STEMI, T wave inversions or depressions.) Acute CHF.**
- **Transcutaneous Pacing Procedure (TCP)**
 - **Indicated with unstable bradycardia unresponsive to medical therapy.**
 - **If time allows transport to specialty center because transcutaneous pacing is a temporizing measure.**
 - **Transvenous / permanent pacemaker will probably be needed.**
 - **Immediate TCP with high-degree AV block (2d or 3d degree) with no IV / IO access.**
- **Most maternal medications pass through breast milk to the infant so maintain high-index of suspicion for OD-toxins.**
- **Hypoglycemia, severe dehydration and narcotic effects may produce bradycardia. Many other agents a child ingests can cause bradycardia, often is a single dose.**



Pediatric Pulmonary Edema / CHF

History

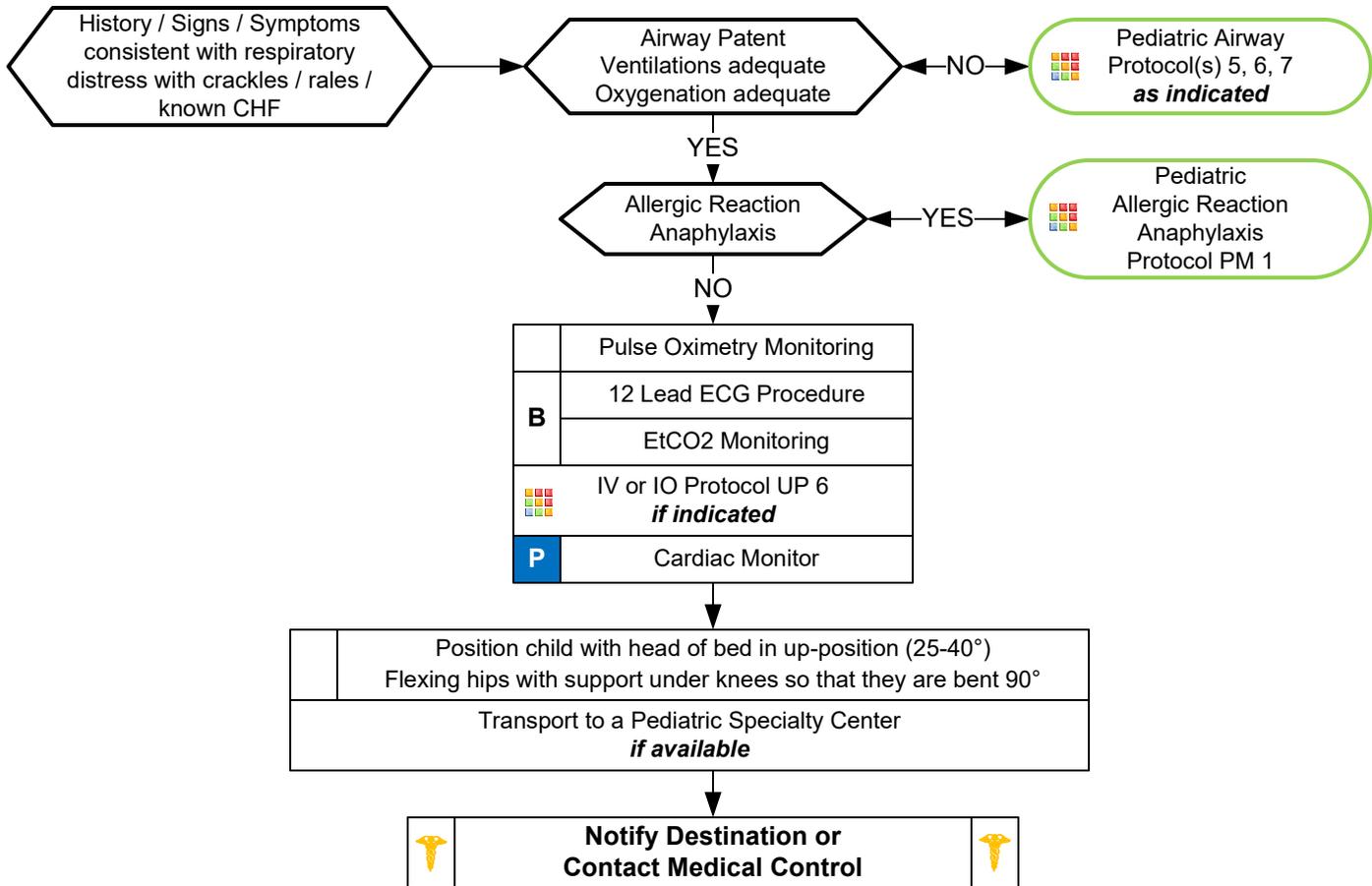
- Congenital Heart Disease
- Chronic Lung Disease
- Congestive heart failure
- Past medical history

Signs/Symptoms

- Infant: Respiratory distress, poor feeding, lethargy, weight gain, +/- cyanosis
- Child/Adolescent: Respiratory distress, bilateral rales, apprehension, orthopnea, jugular vein distention (rare), pink, frothy sputum, peripheral edema, diaphoresis, chest pain
- Hypotension, shock

Differential

- Congestive heart failure
- Asthma
- Anaphylaxis
- Aspiration
- Pleural effusion
- Pneumonia
- Pulmonary embolus
- Pericardial tamponade
- Toxic Exposure



Pearls

- **Recommended exam: Mental status, Respiratory, Cardiac, Skin, Neuro**
- **Contact Medical Control early in the care of the pediatric cardiac patient.**
- **Most children with CHF have a congenital heart defect, obtain a precise past medical history.**
- **Congenital heart disease varies by age:**
 - < 1 month: Tetralogy of Fallot, Transposition of the great arteries, Coarctation of the aorta.
 - 2 – 6 months: Ventricular septal defects (VSD), Atrioseptal defects (ASD).
 - Any age: Myocarditis, Pericarditis, SVT, heart blocks.
- **Treatment of Congestive Heart Failure / Pulmonary edema may vary depending on the underlying cause and may include the following with consultation by Medical Control:**
 - Morphine Sulfate: 0.1 mg/kg IV / IO. Max single dose 5mg/dose**
 - Fentanyl: 1 mcg/kg IV / IO. Max single dose 50 mcg.**
 - Nitroglycerin: Dose determined after consultation of Medical Control.**
 - Lasix 1 mg/kg IV / IO.**
 - Agency specific vasopressor.**
- Do not assume all wheezing is pulmonary, especially in a cardiac child: avoid albuterol unless strong history of recurrent wheezing secondary to pulmonary etiology (discuss with Medical Control)



Pediatric Cardiac Arrest

History

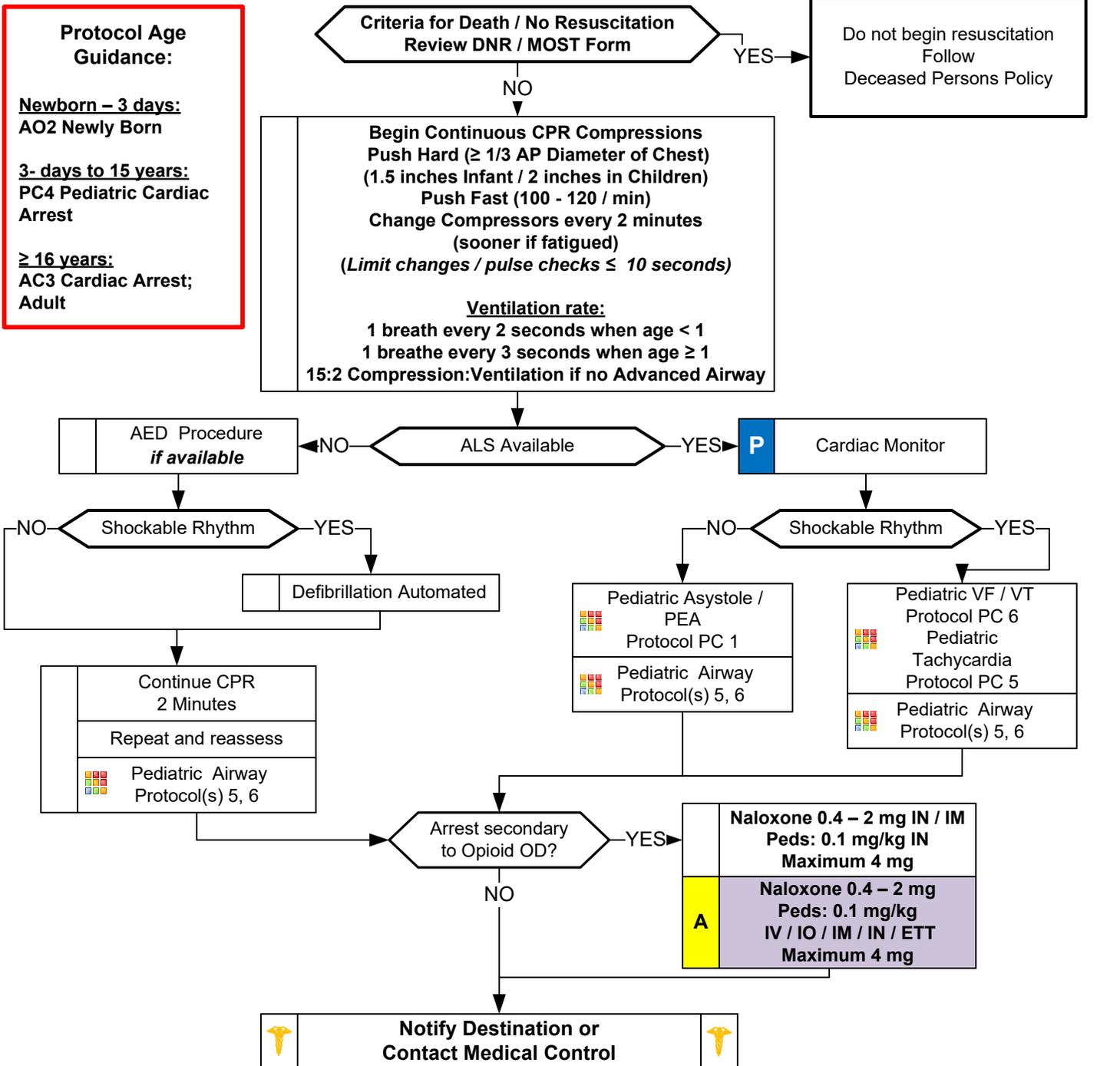
- Time of arrest
- Medical history
- Medications
- Possibility of foreign body
- Hypothermia

Signs and Symptoms

- Unresponsive
- Cardiac arrest

Differential

- Respiratory failure: Foreign body, Secretions, Infection (croup, epiglottitis)
- Hypovolemia (dehydration)
- Congenital heart disease
- Trauma
- Tension pneumothorax, cardiac tamponade, pulmonary embolism
- Hypothermia
- Toxin or medication
- Electrolyte abnormalities (Glucose, K)
- Acidosis





Pediatric Cardiac Arrest

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to optional protocol or development of local agency protocol.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated. Compress $\geq 1/3$ anterior-posterior diameter of chest, in infants 1.5 inches and in children 2 inches.**
- **Majority of pediatric arrests stem from a respiratory insult or hypoxic event. Compressions should be coupled with ventilations.**
- **When advanced airway not in place perform 15 compressions with 2 ventilations.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **DO NOT HYPERVENTILATE:**
If advanced airway in place ventilate:
Age < 1 year: 1 breath every 2 seconds with continuous, uninterrupted compressions.
Age ≥ 1 year: 1 breath every 3 seconds with continuous, uninterrupted compressions.
- **Patient survival is often dependent on proper ventilation and oxygenation / airway Interventions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **High-Quality CPR:**
Make sure chest compressions are being delivered at 100 – 120 / min.
Make sure chest compressions are adequate depth for age and body habitus.
Make sure you allow full chest recoil with each compression to provide maximum perfusion.
Minimize all interruptions in chest compressions to < 10 seconds.
Use AED or apply ECG monitor / defibrillator as soon as available.
- **Defibrillation:**
Follow manufacture's recommendations concerning defibrillation / cardioversion energy when specified.
Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause.
Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- **End Tidal CO₂ (EtCO₂)**
If EtCO₂ is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
If EtCO₂ spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **IV / IO access and drug delivery are secondary to high-quality chest compressions and early defibrillation.**
- **IV access is preferred route. Follow IV or IO Access Protocol UP 6.**
- **Special Considerations**
Maternal Arrest - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. Place mother supine and perform Manual Left Uterine Displacement moving uterus to the patient's left side. IV/IO access preferably above diaphragm.
Defibrillation is safe at all energy levels.
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Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.**



Pediatric Tachycardia

Narrow Complex (≤ 0.09 sec)

History

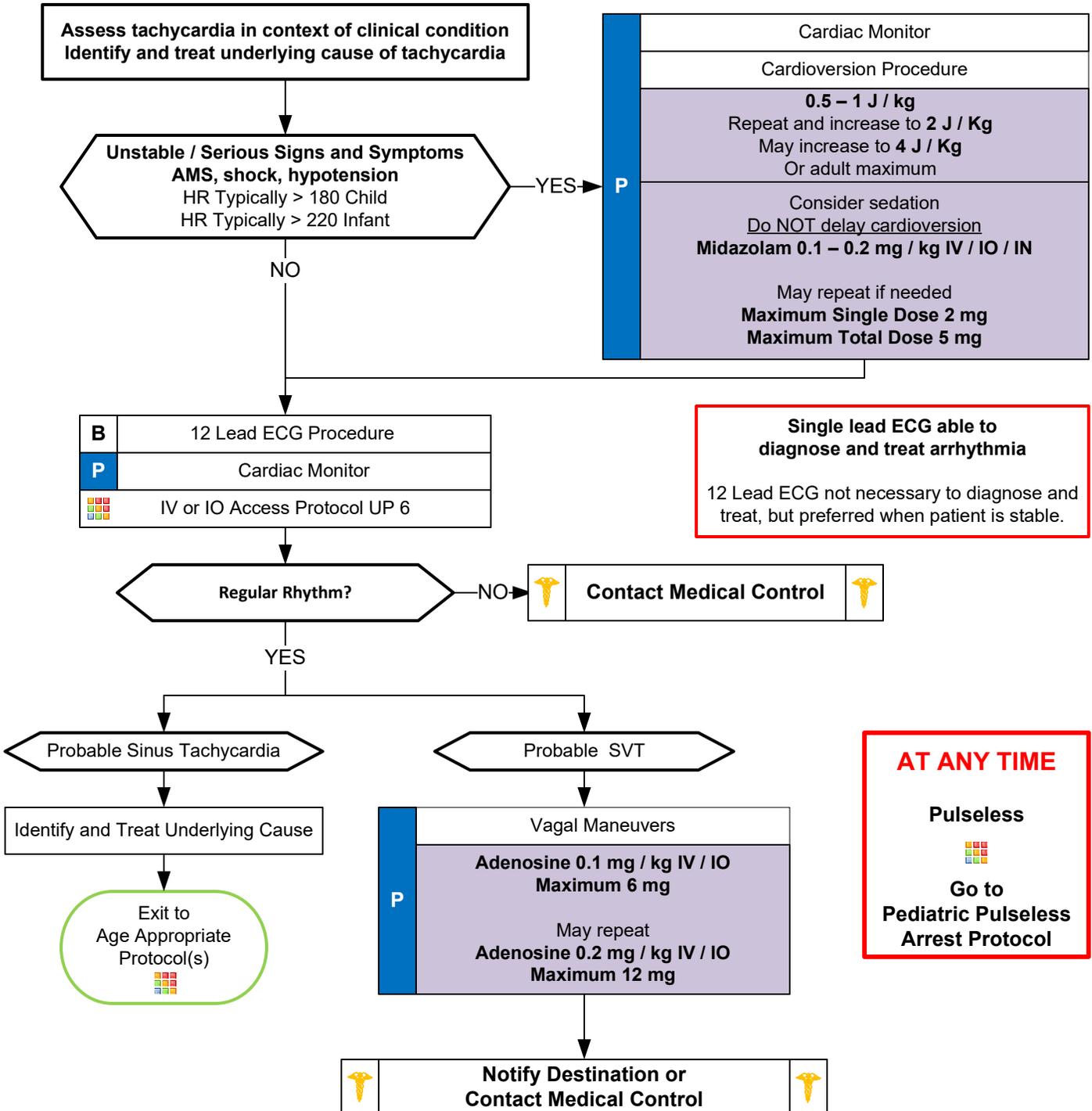
- Past medical history
- Medications or Toxic Ingestion (Aminophylline, Diet pills, Thyroid supplements, Decongestants, Digoxin)
- Drugs (nicotine, cocaine)
- Congenital Heart Disease
- Respiratory Distress
- Syncope or Near Syncope

Signs and Symptoms

- Heart Rate: Child > 180 /bpm
Infant > 220 /bpm
- Pale or Cyanosis
- Diaphoresis
- Tachypnea
- Vomiting
- Hypotension
- Altered Level of Consciousness
- Pulmonary Congestion
- Syncope

Differential

- Heart disease (Congenital)
- Hypo / Hyperthermia
- Hypovolemia or Anemia
- Electrolyte imbalance
- Anxiety / Pain / Emotional stress
- Fever / Infection / Sepsis
- Hypoxia, Hypoglycemia
- Medication / Toxin / Drugs (see HX)
- Pulmonary embolus
- Trauma, Tension Pneumothorax





Pediatric Tachycardia

Narrow Complex (≤ 0.09 sec)

If Fever 101F or above - likely Sepsis -- treat underlying problem not tachycardia !

If Heartrate increases with Adenosine then likely WPW – No further Adenosine. Absolutely No Cardizem – Contact Med Control

Pearls

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Monomorphic QRS:**
All QRS complexes in a single lead are similar in shape.
- **Polymorphic QRS:**
QRS complexes in a single lead will change from complex to complex.
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **Rhythm should be interpreted in the context of symptoms and pharmacological or electrical treatment given only when symptomatic, otherwise monitor and reassess.**
- **12-Lead ECG:**
12-Lead ECG not necessary to diagnose and treat.
Obtain when patient is stable and/or following rhythm conversion.
When administering adenosine, obtaining a continuous 12-Lead can be helpful to physicians.
- **Unstable condition:**
Condition which acutely impairs vital organ function and cardiac arrest may be imminent.
If at any point patient becomes unstable move to unstable arm in algorithm
If IV or IO access is in place, may administer adenosine and repeat, prior to synchronized cardioversion.
- **Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.**
- **Serious Signs and Symptoms:**
Respiratory distress / failure.
Signs of shock / poor perfusion with or without hypotension.
AMS
Sudden collapse with rapid, weak pulse
- **Narrow Complex Tachycardia (≤ 0.09 seconds):**
Sinus tachycardia: P waves present. Variable R-R waves. Infants usually < 220 beats / minute. Children usually < 180 beats / minute.
SVT: > 90 % of children with SVT will have a narrow QRS (≤ 0.09 seconds.) P waves absent or abnormal. R-R waves not variable. Usually abrupt onset. Infants usually > 220 beats / minute. Children usually > 180 beats / minute.
Atrial Flutter / Fibrillation
- **Vagal Maneuvers:**
Breath holding. Blowing a glove into a balloon. Have child blow out “birthday candles” or through an obstructed straw. Infants: May put a bag of ice water over the upper half of the face careful not to occlude the airway.
- Separating the child from the caregiver may worsen the child's clinical condition.
- Monitor for respiratory depression and hypotension associated if Diazepam, Lorazepam, or Midazolam is used.
- Continuous pulse oximetry is required for all SVT Patients if available.



Pediatric Tachycardia

Wide Complex (> 0.09 sec)

History

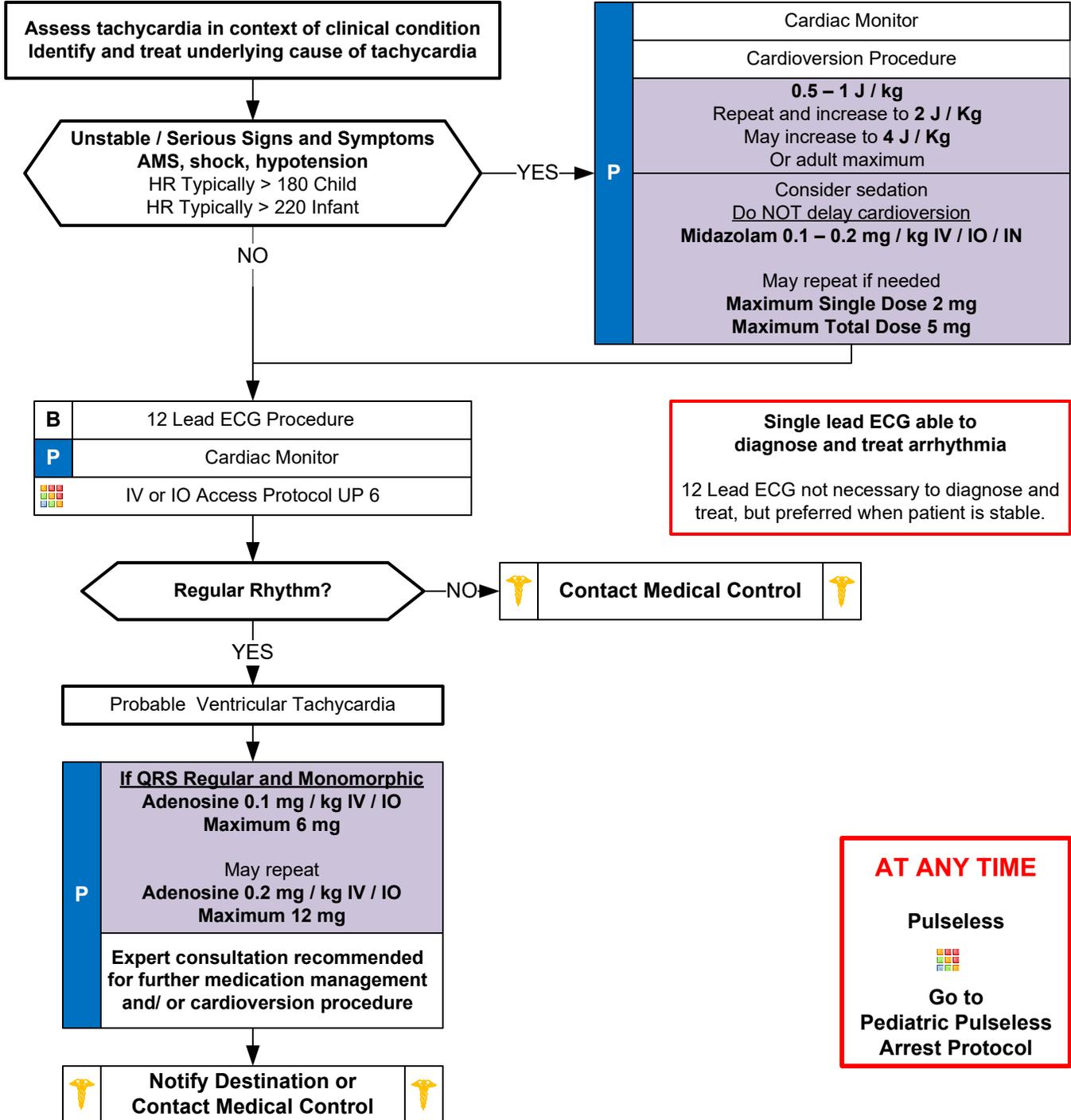
- Past medical history
- Medications or Toxic Ingestion (Aminophylline, Diet pills, Thyroid supplements, Decongestants, Digoxin)
- Drugs (nicotine, cocaine)
- Congenital Heart Disease
- Respiratory Distress
- Syncope or Near Syncope

Signs and Symptoms

- Heart Rate: Child > 180/bpm
Infant > 220/bpm
- Pale or Cyanosis
- Diaphoresis
- Tachypnea
- Vomiting
- Hypotension
- Altered Level of Consciousness
- Pulmonary Congestion
- Syncope

Differential

- Heart disease (Congenital)
- Hypothermia/ Hyperthermia
- Hypovolemia or Anemia
- Electrolyte imbalance
- Anxiety/ Pain/ Emotional stress
- Fever/ Infection/ Sepsis
- Hypoxia, Hypoglycemia
- Medication/ Toxin/ Drugs (see HX)
- Pulmonary embolus
- Trauma, Tension Pneumothorax





Pediatric Tachycardia

Wide Complex (> 0.09 sec)

If Fever 101F or above - likely Sepsis -- treat underlying problem not tachycardia !

If Heartrate increases with Adenosine then likely WPW – No further Adenosine. Absolutely No Cardizem – Contact Med Control

Pearls

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Neuro**
- **Monomorphic QRS:**
All QRS complexes in a single lead are similar in shape.
- **Polymorphic QRS:**
QRS complexes in a single lead will change from complex to complex.
- Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.
- Rhythm should be interpreted in the context of symptoms and pharmacological or electrical treatment given only when symptomatic, otherwise monitor and reassess.
- **12-Lead ECG:**
12-Lead ECG is not necessary to diagnose and treat arrhythmia. A single lead ECG is often all that is needed.
Obtain 12-Lead when patient is stable and/ or following a rhythm conversion.
When administering adenosine, obtaining a continuous 12-Lead can be helpful later to physicians.
- **Unstable condition:**
Condition which acutely impairs vital organ function and cardiac arrest may be imminent.
If at any point patient becomes unstable move to unstable arm in algorithm
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.
- **Serious Signs and Symptoms:**
Respiratory distress/ failure.
Signs of shock/ poor perfusion with or without hypotension.
AMS
Sudden collapse with rapid, weak pulse
- **Serious Signs and Symptoms:**
Respiratory distress/ failure.
Signs of shock/ poor perfusion with or without hypotension.
AMS
Sudden collapse with rapid, weak pulse
- **Wide Complex Tachycardia (≥ 0.09 seconds):**
SVT with aberrancy.
VT: Uncommon in children. Rates may vary from near normal to > 200/ minute.
Most children with VT have underlying heart disease / cardiac surgery/ long QT syndrome/ cardiomyopathy.
Amiodarone 5 mg / kg over 20 – 60 minutes or Procainamide 15 mg / kg over 30 – 60 minutes IV / IO are recommended agents. They should not be administered together. Consultation with Medical Control is advised when these agents are considered.
- **Torsade's de Pointes/ Polymorphic (multiple shaped) Tachycardia:**
Rate is typically 150 to 250 beats/ minute.
Associated with long QT syndrome, hypomagnesaemia, hypokalemia, many cardiac drugs.
May quickly deteriorate to VT.
Separating the child from the caregiver may worsen the child's clinical condition.
- Monitor for respiratory depression and hypotension associated if Diazepam, Lorazepam, or Midazolam is used.
- Continuous pulse oximetry is required for all SVT patients if available.



Pediatric Ventricular Fibrillation Pulseless Ventricular Tachycardia

History

- Events leading to arrest
- Estimated downtime
- Past medical history
- Medications
- Existence of terminal illness
- Airway obstruction
- Hypothermia

Signs and Symptoms

- Unresponsive
- Cardiac Arrest

Differential

- Respiratory failure / Airway obstruction
- Hyper / hypokalemia, Hypovolemia
- Hypothermia, Hypoglycemia, Acidosis
- Tension pneumothorax, Tamponade
- Toxin or medication
- Thrombosis: Coronary / Pulmonary Embolism
- Congenital heart disease

Pediatric Pulseless Arrest Protocol PC 4

	<p>Begin Continuous CPR Compressions Push Hard ($\geq 1/3$ AP Diameter of Chest) (1.5 inches Infant / 2 inches in Children) Push Fast (100 - 120 / min) Change Compressors every 2 minutes (sooner if fatigued) <i>(Limit changes / pulse checks ≤ 10 seconds)</i></p> <p>Ventilation rate: 1 breath every 2 seconds when age < 1 1 breathe every 3 seconds when age ≥ 1 15:2 Compression:Ventilation if no Advanced Airway</p>
	Automated Defibrillation Procedure
P	<p>Defibrillation Manual Procedure</p> <ul style="list-style-type: none"> • First shock: 2 J / Kg • Second shock: 4 J / Kg • Subsequent shocks ≥ 4 J / kg <p>Maximum 10 J / kg or adult dose</p>
	IV / IO Protocol UP 6
A	<p>Epinephrine 1:10,000 0.01 mg/kg IV / IO Maximum 1mg Or Epinephrine 1:1000 0.1 mg / kg ETT Maximum 2.5 mg No Repeat Dosing – 1 dose total</p>
	<p>If Rhythm Refractory to defibrillation</p> <ul style="list-style-type: none"> • Continue CPR and give Agency specific Anti-arrhythmic(s) in a drug-shock-drug-shock pattern. • Continue CPR up to point where you are ready to defibrillate with device charged. <p>Repeat pattern during resuscitation.</p>
P	<p>Amiodarone IO/IV 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT Consider Magnesium</p>
A	<p>Magnesium Sulfate 40 mg/kg IV / IO Infuse over 2 – 3 minutes Maximum 2 gm</p>

AT ANY TIME

Return of Spontaneous Circulation

Go to Post Resuscitation Protocol

Reversible Causes

Hypovolemia
 Hypoxia
 Hydrogen ion (acidosis)
 Hypothermia
 Hypo / Hyperkalemia
 Hypoglycemia

Tension pneumothorax
 Tamponade; cardiac
 Toxins
 Thrombosis; pulmonary (PE)
 Thrombosis; coronary (MI)



Notify Destination or Contact Medical Control





Pediatric Ventricular Fibrillation Pulseless Ventricular Tachycardia

Manual Defib in pediatrics is restricted to a paramedic skill for pediatrics. EMT/AEMT must use AED for pediatrics.

Only 1 code dose Epi – May use Push Dose Epi or Epi Drip in Rosc

Pearls

- **Team Focused Approach / Pit-Crew Approach recommended; assigning responders to predetermined tasks. Refer to optional protocol or development of local agency protocol.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated. Compress $\geq 1/3$ anterior-posterior diameter of chest, in infants 1.5 inches and in children 2 inches.**
- **Majority of pediatric arrests stem from a respiratory insult or hypoxic event. Compressions should be coupled with ventilations.**
- **When advanced airway not in place perform 15 compressions with 2 ventilations.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **DO NOT HYPERVENTILATE:**
If advanced airway in place ventilate:
Age < 1 year: 1 breath every 2 seconds with continuous, uninterrupted compressions.
Age ≥ 1 year: 1 breath every 3 seconds with continuous, uninterrupted compressions.
- **Patient survival is often dependent on proper ventilation and oxygenation / airway Interventions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- **High-Quality CPR:**
Make sure chest compressions are being delivered at 100 – 120 / min.
Make sure chest compressions are adequate depth for age and body habitus.
Make sure you allow full chest recoil with each compression to provide maximum perfusion.
Minimize all interruptions in chest compressions to < 10 seconds.
Use AED or apply ECG monitor / defibrillator as soon as available.
- **Defibrillation:**
Follow manufacture's recommendations concerning defibrillation / cardioversion energy when specified.
Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause.
Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- **End Tidal CO₂ (EtCO₂)**
If EtCO₂ is < 10 mmHg, improve chest compressions. Goal is ≥ 20 mmHg.
If EtCO₂ spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **IV / IO access and drug delivery are secondary to high-quality chest compressions and early defibrillation.**
- **IV access is preferred route. Follow IV or IO Access Protocol UP 6.**
- **Special Considerations**
Maternal Arrest - Treat mother per appropriate protocol with immediate notification to Medical Control and rapid transport preferably to obstetrical center if available and proximate. Place mother supine and perform Manual Left Uterine Displacement moving uterus to the patient's left side. IV/IO access preferably above diaphragm.
Defibrillation is safe at all energy levels.
Renal Dialysis / Renal Failure - Refer to Dialysis / Renal Failure Protocol AM 3 caveats when faced with dialysis / renal failure patient experiencing cardiac arrest.
Opioid Overdose - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol UP 7 while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.**



Pediatric Post Resuscitation

History

- Respiratory arrest
- Cardiac arrest

Signs/Symptoms

- Return of pulse

Differential

- Continue to address specific differentials associated with the original dysrhythmia

Transport Destination Decision

Post-resuscitation patient is medically complex.

Consider facility capabilities:

- Pediatric ICU service
- Pediatric Cardiology service
- Pediatric Neurology service
- Targeted Temperature Management

	 Pediatric Airway Protocol(s) AR 5 - 7 as needed
	Monitor Vital Signs / Reassess
	Blood Glucose Analysis Procedure
	Optimize Ventilation and Oxygenation <ul style="list-style-type: none"> • Maintain SpO2 ≥ 92 – 98% • Advanced airway if indicated • Age Appropriate Respiratory Rate • Remove Impedance Threshold Device DO NOT HYPERVENTILATE
	ETCO2 ideally 35 – 45 mm Hg
B	12 Lead ECG Procedure
	IV or IO Protocol UP 6
P	Cardiac Monitor
	Pediatric Diabetic Protocol PM 2 if indicated
	Pediatric Hypotension / Shock Protocol PM 3 if indicated
	Pediatric Bradycardia Protocol PC 2 if indicated
	Pediatric Tachycardia Protocol PC 5, 6 as indicated

Hypotension Age Based

0 – 31 Days
< 60 mmHg

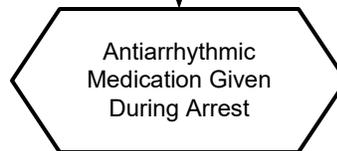
1 Month to 1 Year
< 70 mmHg

> than 1 Year
< 70 + (2 x age) mmHg

Arrhythmias are common and usually self limiting after ROSC



If Arrhythmia Persists follow Rhythm Appropriate Protocol



YES

NO

P	Continue Antiarrhythmic Utilized Refer to Appropriate Pediatric Arrhythmia Protocol
	Amiodarone IO/IV dose: 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT

	Post-intubation / BIAD Management Protocol AR 8
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	Notify Destination or Contact Medical Control	
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Pediatric Post Resuscitation

Pearls

- **Recommended Exam: Mental Status, Neck, Skin, Lungs, Heart, Abdomen, Extremities, Neuro**
- **Goals of care are to preserve neurologic function, prevent secondary organ damage, treat the underlying cause of illness, and optimize prehospital care. Frequent reassessment is necessary.**
- **Hyperventilation is a significant cause of hypotension and recurrence of cardiac arrest in the post resuscitation phase and must be avoided. Titrate FiO₂ to maintain SpO₂ of 92 - 98%.**
- **Use length-based or weight-based pediatric resuscitation system for medication, equipment, cardioversion, and defibrillation guidance. Pediatric paddles should be used in children < 10 kg.**
- **Pain/sedation:**

Patients requiring advanced airways and ventilation commonly experience pain and anxiety. Unrelieved pain can lead to increased catecholamine release, ischemia, immunosuppression, and prolonged hospitalization.

Ventilated patients cannot communicate pain / anxiety and providers are poor at recognizing pain / anxiety.

Vital signs such as tachycardia and / or hypertension can provide clues to inadequate sedation, however they both are not always reliable indicators of patient's lack of adequate sedation.

Pain must be addressed first, before anxiety. Opioids are typically the first line agents before benzodiazepines. Ketamine is also a reasonable first choice agent.
- **Ventilator / Ventilation strategies:**

Tailored to individual patient presentations. Medical Control can indicate different strategies above.

In general ventilation with BVM should cause chest rise. With mechanical ventilation a reasonable tidal volume should be about 6 mL/kg and peak pressures should be < 30 cmH₂O.

Continuous pulse oximetry and capnography should be maintained during transport for monitoring.

Head of bed should be maintained at least 10 – 20 degrees of elevation when possible to decrease aspiration risk.
- **EtCO₂ Monitoring:**

Initial End tidal CO₂ may be elevated immediately post-resuscitation, but will usually normalize.

Goal is 35 – 45 mmHg but DO NOT hyperventilate to achieve.

EtCO₂ should be continually monitored with advanced airway in place.
- **Administer resuscitation fluids and vasopressor agents to maintain SBP at targets listed on page 1. This table represents minimal SBP targets.**
- **Targeted Temperature Management is recommended in pediatrics, but prehospital use is not associated with improved outcomes. Transport to facility capable of intensive pediatric care.**
- **Consider transport to facility capable of managing the post-arrest patient including hypothermia therapy, cardiology / cardiac catheterization, intensive care service, and neurology services.**
- **The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require close monitoring. Appropriate post-resuscitation management may best be planned in consultation with Medical Control.**



Pediatric Allergic Reaction

History

- Onset and location
- Insect sting or bite
- Food allergy/ exposure
- Medication allergy/ exposure
- New clothing, soap, detergent
- Past medical history/ reactions
- Medication history

Signs and Symptoms

- Itching or hives
- Coughing/ wheezing or respiratory distress
- Chest or throat constriction
- Difficulty swallowing
- Hypotension or shock
- Edema

Differential

- Urticaria (rash only)
- Anaphylaxis (systemic effect)
- Shock (vascular effect)
- Angioedema (drug induced)
- Aspiration/ Airway obstruction
- Vasovagal event
- Asthma/ COPD /CHF

Assess Symptom Severity

MILD
Skin Only

MODERATE / SEVERE +/- hypotension
2+ Body Systems

Diphenhydramine
1 mg/kg mg PO
Maximum 50 mg
See Pearls

IV or IO Protocol UP 6
If indicated

Diphenhydramine
1 mg/kg IV / IM / IO / PO
Maximum 50 mg

Pepcid 0.25mg/kg IV/IO
Max 20mg - *If available*

Monitor and Reassess
Monitor for Worsening
Signs and Symptoms

Diphenhydramine
1 mg/kg mg PO
Maximum 50 mg
See Pearls

Epinephrine 1:1000 IM
≥ 30 kg 0.3 – 0.5 mg IM
< 30 kg 0.15 mg IM
Repeat every 5 minutes
if no improvement

Albuterol Nebulizer
2.5 – 5 mg
Repeat as needed x 3
if indicated

Epinephrine 1:1000 IM
≥ 30 kg 0.3 – 0.5 mg IM
< 30 kg 0.15 mg IM
Repeat every 5 minutes
if no improvement

Diphenhydramine
1 mg/kg IV / IM / IO / PO
Maximum 50 mg

Airway Pediatric Protocol(s)
if indicated

Pediatric Hypotension/ Shock
Protocol PM 3
if indicated

May substitute Epinephrine 1:1000 IM
with the following:
Peds patients 15 – 30 kg:
Epinephrine nasal spray 1mg IN
May repeat in 5 minutes x 1 in other nostril

IV or IO Access Protocol UP 6

Albuterol Nebulizer
2.5 – 5 mg
+/- Ipratropium 0.5 mg (DuoNeb)
Repeat as needed x 3
if indicated

Pepcid 0.25mg/kg IV/IO
Max 20mg - *If available*

Normal Saline Bolus
20 mL/kg IV / IO
Repeat as needed
Maximum 60 mL/kg Liter(s)

Dexamethasone
0.5 mg/kg IV
Maximum 10 mg

No improvement with IM Epinephrine
Epinephrine 1:10K IV / IO q 5min
If <30Kg - 0.15mg >30Kg - 0.3-0.5 mg

**Notify Destination or
Contact Medical Control**



Pediatric Allergic Reaction

Administer Decadron slow or dilute – can cause intense GU flushing/burning

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen**
- **Anaphylaxis is an acute and potentially lethal multisystem allergic reaction.**
- **Epinephrine administration:**
 - **Drug of choice and the FIRST drug that should be administered in acute anaphylaxis (Moderate/ Severe Symptoms.)**
 - **IM Epinephrine should be administered in priority before or during attempts at IV or IO access.**
- **Diphenhydramine and steroid administration:**
 - **Diphenhydramine/ steroids have no proven benefit in Moderate/ Severe anaphylaxis.**
 - **Diphenhydramine/ steroids should NOT delay initial or repeat Epinephrine administration.**
 - **In Moderate and Severe anaphylaxis, Diphenhydramine may decrease mental status.**
 - **Diphenhydramine should NOT be given to a patient with decreased mental status and/ or a hypotensive patient as this may cause nausea, vomiting, and/ or worsening mental status.**
- **Anaphylaxis unresponsive to repeat doses of IM epinephrine may require IV epinephrine administration by IV push or epinephrine infusion. Contact Medical Control for appropriate dosing.**
- **Symptom Severity Classification:**
 - **Mild symptoms:**
 - **Flushing, hives, itching, erythema with normal blood pressure and perfusion.**
 - **Moderate symptoms:**
 - **Flushing, hives, itching, erythema plus respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with normal blood pressure and perfusion.**
 - **Severe symptoms:**
 - **Flushing, hives, itching, erythema plus respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with hypotension and poor perfusion.**
- **Allergic reactions may occur with only respiratory and gastrointestinal symptoms and have no rash/ skin involvement.**
- **Angioedema** is seen in moderate to severe reactions and is swelling involving the face, lips or airway structures. This can also be seen in patients taking blood pressure medications like Prinivil / Zestril (lisinopril)-typically end in -il.
- **Hereditary Angioedema** involves swelling of the face, lips, airway structures, extremities, and may cause moderate to severe abdominal pain. Some patients are prescribed specific medications to aid in reversal of swelling. **Paramedic may assist or administer this medication per patient/ package instructions.**
- **Fluids and Medication titrated to maintain a SBP >70 + (age in years x 2) mmHg.**
- **Patients with moderate and severe reactions should receive a 12-Lead ECG and should be continually monitored, but this should NOT delay administration of epinephrine.**
- **EMR/ EMT:**
 - **The use of Epinephrine IM is limited to the treatment of anaphylaxis and may be given only by autoinjector, unless manual draw-up is approved by the Agency Medical Director and the NC office of EMS.**
 - **Administration of diphenhydramine is limited to the oral route only.**
 - **EMT administration of beta-agonist is limited to only patients currently prescribed the medication, unless approved by the Agency Medical Director and the NC office of EMS.**
 - **Agency Medical Director may require contact of medical control prior to EMT/ EMR administering any medication(s). Medical Director may require contact of medical control prior to EMT/ EMR administering any medication.**
 - **The shorter the onset from exposure to symptoms the more severe the reaction.**



Pediatric Diabetic

History

- Past medical history
- Medications
- Recent blood glucose check
- Last meal

Signs and Symptoms

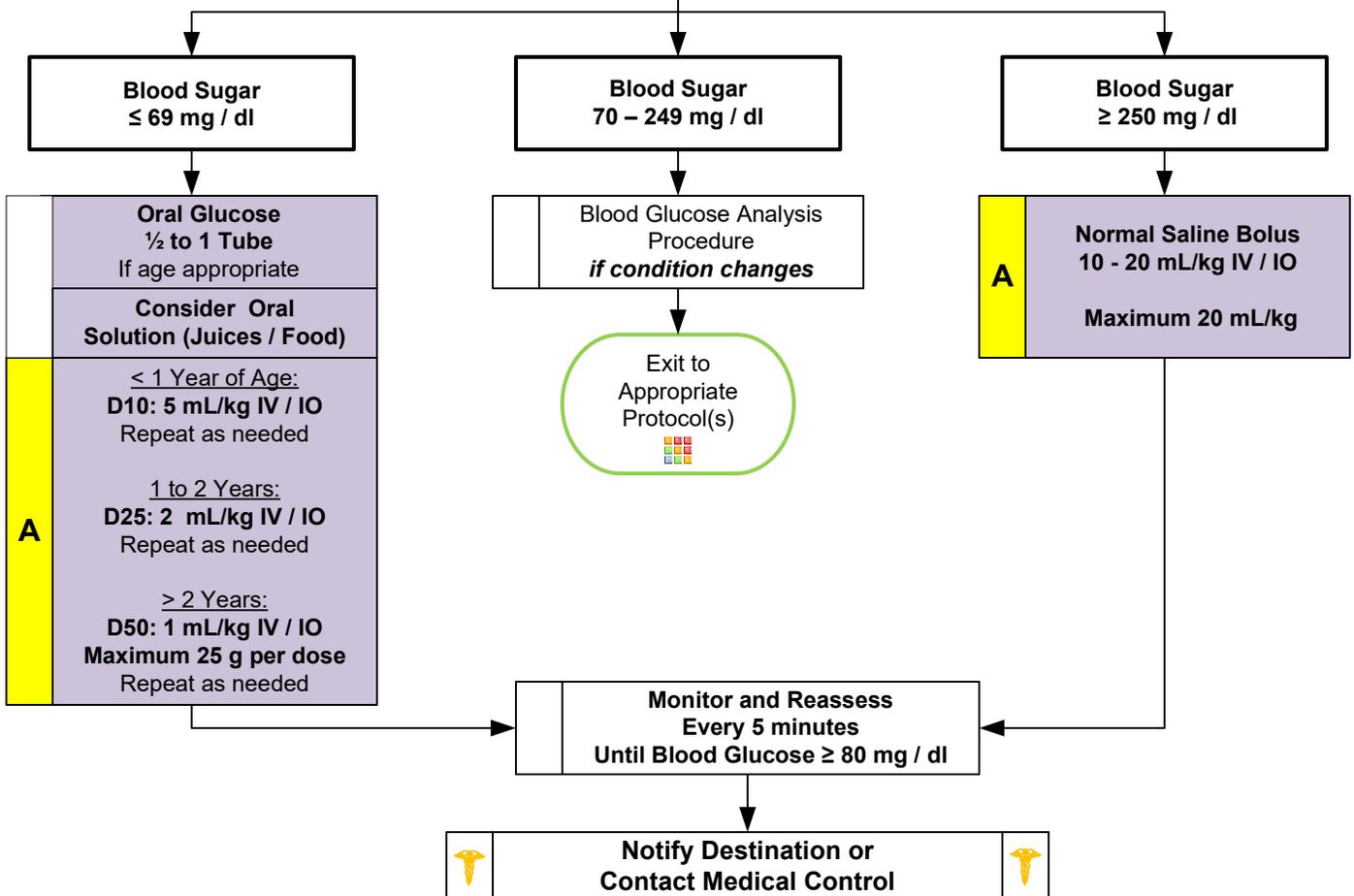
- Altered mental status
- Combative/ irritable
- Diaphoresis
- Seizures
- Abdominal pain
- Nausea/ vomiting
- Weakness
- Dehydration
- Deep/ rapid breathing

Differential

- Alcohol/ drug use
- Toxic ingestion
- Trauma; head injury
- Seizure
- CVA
- Altered baseline mental status.

	Blood Glucose Analysis Procedure
B	12 Lead ECG Procedure <i>if indicated</i>
	IV or IO Access Protocol UP 6
P	Cardiac Monitor
	Altered Mental Status Protocol UP 4 <i>if indicated</i>
	Hypotension/ Shock Protocol AM 5 <i>if indicated</i>
	Seizure Protocol UP 13 <i>if indicated</i>

B	<p>Blood glucose ≤ 69 mg/dl Symptomatic with NO IV / IO Access: Awake, alert and able to tolerate oral agent: Give oral glucose solution. If unable to tolerate oral: Glucagon 0.1 mg/kg IM (Maximum 1 mg) Repeat every 15 minutes as needed to keep Blood glucose > 60 mg / dl.</p>
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Pediatric Diabetic

Pearls

- **Recommended Exam: Mental Status, HEENT, Skin, Respirations and effort, Abdomen, Neuro.**
- **Patients with prolonged hypoglycemia or those who are malnourished may not respond to glucagon.**
- **Do not administer oral glucose to patients that are not able to swallow or protect their airway.**
- **Quality control checks should be maintained per manufacturers recommendation for all glucometers.**
- **D10/ D25 Preparation:**
 - D10: Remove 10 mL of D50 from a D50 vial. Add 40 mL of NS with the 10 mL of D50 with a total volume of 50 mL.
 - D10: Alternative, Discard 40 mL from the D50 vial and draw up 40 mL of NS with a total volume of 50 mL.
 - D25: Remove 25 mL of D50 and draw up 25 mL of NS with a total volume of 50 mL.
- **Patient's refusing transport to medical facility after treatment of hypoglycemia:**
 - Adult caregiver must be present with pediatric patient.
 - Blood sugar must be ≥ 80 , patient has ability to eat and availability of food with responders on scene.
 - Patient must have known history of diabetes and not taking any oral diabetic agents.
 - Patient returns to normal mental status and has a normal neurological exam with no new neurological deficits.
 - Must demonstrate capacity to make informed health care decisions. See Universal Patient Care Protocol UP-1.
 - Otherwise contact medical control.
- **Hypoglycemia with Oral Agents:**
 - Patients taking oral diabetic medications should be strongly encouraged to allow transportation to a medical facility.
 - They are at risk of recurrent hypoglycemia that can be delayed for hours and require close monitoring even after normal blood glucose is established.
 - Not all oral agents have prolonged action so Contact Medical Control or NC Poison Control Center for advice.
 - Patients who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.
- **Hypoglycemia with Insulin Agents:**
 - Many forms of insulin now exist. Longer acting insulin places the patient at risk of recurrent hypoglycemia even after a normal blood glucose is established.
 - Not all insulins have prolonged action so Contact Medical Control for advice. Patients who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal.
- In extreme circumstances with no IV and no response to glucagon, Dextrose 50 % can be administered rectally. Contact medical control for advice.



Pediatric Hypotension/ Shock

History

- Blood loss
- Fluid loss
- Vomiting
- Diarrhea
- Fever
- Infection

Signs and Symptoms

- Restlessness, confusion, weakness
- Dizziness
- Tachycardia
- Hypotension (Late sign)
- Pale, cool, clammy skin
- Delayed capillary refill
- Dark-tarry stools

Differential

- Shock
 - Hypovolemic
 - Cardiogenic
 - Septic
 - Neurogenic
 - Anaphylactic
- Trauma
- Infection
- Dehydration
- Congenital heart disease
- Medication or Toxin

	Blood Glucose Analysis Procedure
	IV or IO Access Protocol UP 6
P	Cardiac Monitor
	Pediatric Airway Protocol(s) <i>if indicated</i>
	Diabetic Protocol PM 2 <i>if indicated</i>

Age Specific Blood Pressure indicating possible shock

Age 0 – 28 days: SBP < 60
Ages ≥ 1 month: SBP < 70
Age 1 – 9: SBP < 70 + (2x Age)

Ages 10 – 64: SBP < 90
Ages ≥ 65: SBP < 110

**All ages Shock Index:
HR > SBP**

History and Exam Suggest Type of Shock

Cardiogenic

Hypovolemic

Distributive

Obstructive

Chest Pain: Cardiac and STEMI
 Protocol AC 4
 Appropriate Pediatric Arrhythmia Protocol(s)
if indicated

A Normal Saline Bolus
 5 – 10 mL / kg IV / IO
 Titrate to age appropriate
 SBP ≥ 70 + (2 x Age)
 Maximum 10 mL / kg

Pediatric Allergy Protocol PM 1
if indicated
 Suspected Sepsis Protocol UP 15
if indicated
 Multiple Trauma Protocol TB 6
if indicated

A Normal Saline Bolus
 20 mL / kg IV / IO
 Titrate to age appropriate
 SBP ≥ 70 + (2 x Age)
 Maximum 60 mL / kg

P Chest Decompression-Needle Procedure
if indicated

P Push Dose Vasopressor - Epinephrine 1:100K Give 1cc (10 mcg) q 2 – 3 minutes to effect SBP > 90 Use in patients with BP < 80 & Heart Rate < 200.

Norepinephrine
 Starting Dose: 0.1 mcg / kg / min IV / IO
 Titrate to: SBP ≥ 70 + (2 x Age)
 Max = 2 mcg / kg / min

Notify Destination or Contact Medical Control



Hypotension/ Shock

Dose for pediatric hypotension/shock:

Epinephrine Drip = 0.1 to 1 mcg / kg / minute – 3rd line

Norepinephrine Drip = 0.1 to 2 mcg / kg / minute

For either epinephrine or norepinephrine, start at 0.1 mcg/kg/min and titrate up as needed until Systolic BP \geq 70 + (2 x Age) OR you reach the maximum dose (1 mcg/kg/min for epi; 2 mcg/kg/min for norepi).

Pearls

- **Recommended Exam: Mental Status, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- Consider all possible causes of shock and treat per appropriate protocol. Majority of decompensation in pediatrics is airway or respiratory related.
- Decreasing heart rate and hypotension occur late in children and are signs of impending cardiac arrest.
- Shock may be present with a normal blood pressure initially or even elevated.
- Shock often is present with normal vital signs and may develop insidiously. Tachycardia may be the first and only sign.
- Consider all possible causes of shock and treat per appropriate protocol.
- **Hypovolemic Shock:**
Hemorrhage, trauma, GI bleeding, or pregnancy-related bleeding.
Tranexamic Acid (TXA):
Agencies utilizing Tranexamic acid (TXA) must submit letters from the their receiving trauma centers for approval by the OEMS Medical Director.
Receiving trauma centers must agree to continue Tranexamic acid (TXA) therapy with repeat dosing.
Tranexamic acid (TXA) is NOT indicated and should NOT be administered where trauma occurred > 3 hours prior to EMS arrival.
- **Cardiogenic Shock:**
Heart failure: MI, Cardiomyopathy, Myocardial contusion, Ruptured ventricle/ septum/ valve/ toxins.
- **Distributive Shock:**
Septic/ Anaphylactic/ Neurogenic/ Toxic
Hallmark is warm, dry, pink skin with normal capillary refill time and typically alert.
- **Obstructive Shock:**
Pericardial tamponade. Pulmonary embolus. Tension pneumothorax.
Signs may include hypotension with distended neck veins, tachycardia, unilateral decreased breath sounds or muffled heart sounds.
- **Acute Adrenal Insufficiency or Congenital Adrenal Hyperplasia:**
Body cannot produce enough steroids (glucocorticoids/ mineralocorticoids.)
May have primary or secondary adrenal disease, congenital adrenal hyperplasia, or more commonly have stopped a steroid like prednisone. Injury or illness may precipitate.
Usually hypotensive with nausea, vomiting, dehydration and/ or abdominal pain.
Adults patients:
Methylprednisolone 125 mg IM / IV / IO or
Hydrocortisone 100mg IM / IV / IO
Use steroid agent specific to your drug list. Dexamethasone 10 mg IM / IV / IO can be used if as an alternative

Pediatric patients:
Methylprednisolone 2 mg/kg IM / IV / IO (Maximum 125 mg) or
Hydrocortisone 2mg/kg IM / IV / IO (Maximum 100mg)
Use steroid agent specific to your drug list. Dexamethasone 5 mg IM / IV / IO can be used as an alternative
May administer prescribed steroid carried by patient IM / IV / IO. Patient may have Hydrocortisone (Cortef or Solu - Cortef). Administer 2 mg/kg up to 100 mg IV or dose specified by patient's physician.