

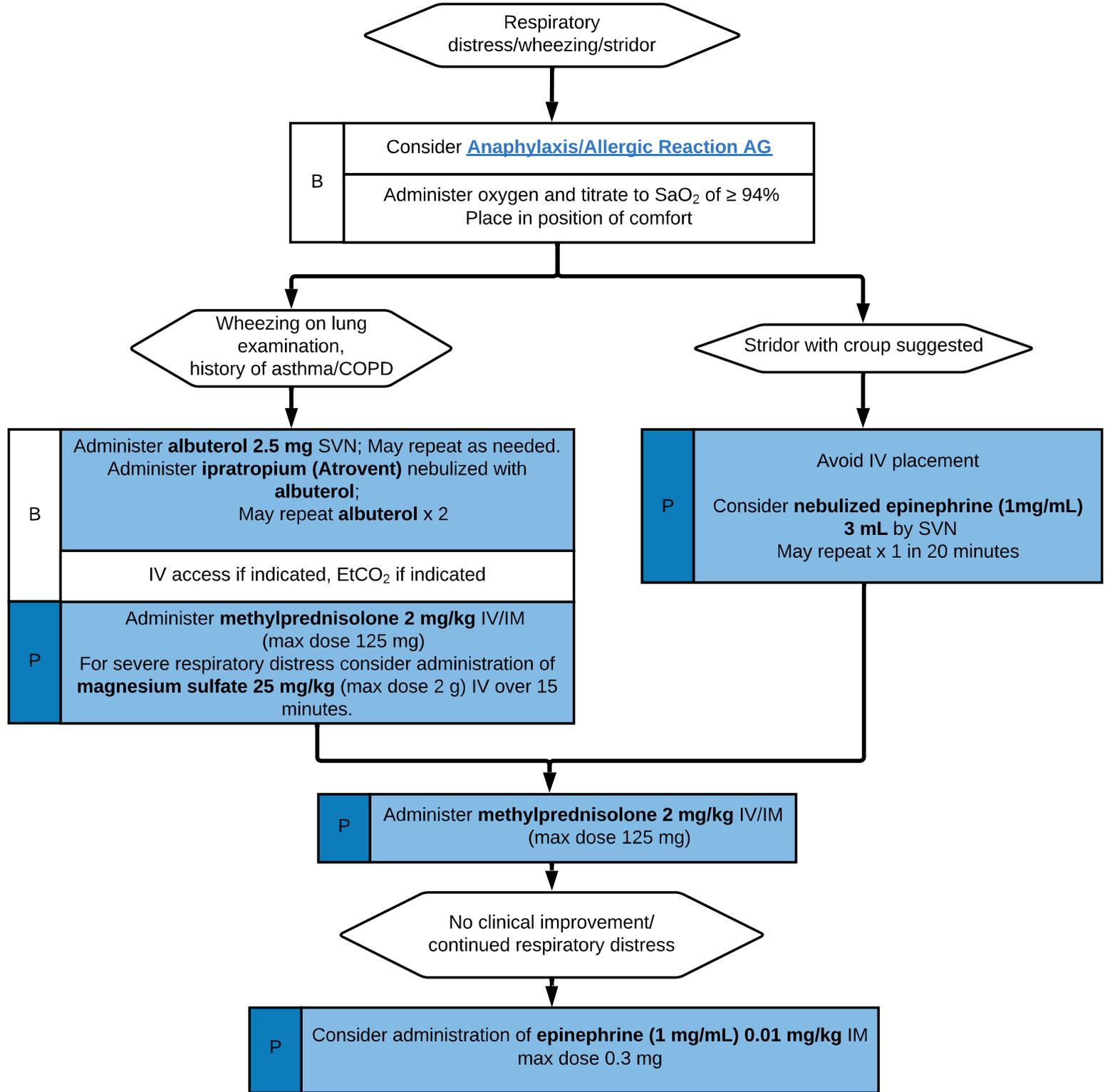


University Emergency Medical Services Pediatric Administrative Guidelines





History <ul style="list-style-type: none"> • Asthma; COPD -- chronic bronchitis, emphysema, • Congestive heart failure • Home treatment (oxygen, nebulizer) • Medications (theophylline, steroids, inhalers) • Toxic exposure, smoke inhalation 	Signs and Symptom <ul style="list-style-type: none"> • Shortness of breath • Decreased ability to speak • Increased work of breathing/accessory muscle use • Wheezing, rhonchi • Fever, cough • Tachycardia 	Differential <ul style="list-style-type: none"> • Asthma • Anaphylaxis • Aspiration/inhaled foreign body • Croup • Pneumonia • Pulmonary embolus • Hyperventilation • Inhaled toxin (i.e. carbon monoxide)
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Education/Pearls

Reactive airway disease is a common cause of respiratory distress in pediatric patients. Pediatric airways are smaller, and partial obstruction - depending on the location of it - causes wheezing and stridor. **Wheezing** is a whistling sound that results from air flowing through the lower airways, and can be caused by asthma, allergies, or other lung diseases. **Stridor** is a harsh, crowing, or vibratory sound of variable pitch that results from turbulent air flow caused by partial obstruction of the upper respiratory passages.

- Pulse oximetry and waveform capnography should be monitored continuously for any patient with respiratory distress.
- Epinephrine may be administered IM for suspected allergic reaction/anaphylaxis or impending respiratory failure related to asthma.

Croup is most common in children ages 6 and younger, and is the most common cause of inspiratory stridor in children. It affects about 60 of every 1,000 children between ages 1 and 2; occurrence drops significantly after age 6.

- When assessing a patient with croup, you may note hoarseness, coryza (acute rhinitis), pharyngeal erythema, and a slightly increased respiratory rate. When croup progresses to upper airway obstruction, the patient may have an increased respiratory rate, nasal flaring, and suprasternal, infrasternal, and intercostal retractions along with continuous stridor.

To aid assessment and diagnosis of croup, clinicians may use the number grades below:

- Grade 1 (*mild*): exertion causes dyspnea or stridor.
- Grade 2 (*moderate*): stridor is present at rest, and worsens with exertion.
- Grade 3 (*severe*): stridor and retractions of the sternal chest wall are present at rest.
- Grade 4 (*impending respiratory failure*): respiratory distress, irritability, pallor or cyanosis, tachycardia, and exhaustion are present at rest.

Audible without a stethoscope, stridor always warrants immediate attention because it may be the first sign of a serious or life-threatening process. Grade 3 and 4 croup is an emergency that necessitates immediate treatment. Your ability to promptly recognize croup and stridor can save a child's life.

In pediatric patients with sudden symptoms of wheezing or stridor, consider foreign body aspiration as a cause. Obtain history to clarify history of recent illness vs sudden onset of symptoms.

Epinephrine (using parenteral 1 mg/mL solution) Nebulization: Nebulize 3 mL of **1 mg/mL** solution, totaling 3 mg of epinephrine. May repeat x 1 in 20 minutes.

Pediatric Bradycardia (age <14) Administrative Guideline



History

- Past medical history
- Foreign body aspiration
- Respiratory distress
- Apnea
- Possible toxic exposure or ingestion
- Congenital diseases
- 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
- Hypothermia
- Toxin, medication
- Hypoglycemia

Bradycardia (HR<60)
causing ALOC, hypotension,
poor perfusion, or shock (usually <50 BPM)

B	Open airway Provide supplemental oxygenation and ventilation as indicated FSBG analysis Search for reversible causes (see differential above)
P	IV/IO access, pulse ox, cardiac monitor 12 lead ECG (do not delay initiating treatment)

Bradycardia (HR<60)
causing ALOC, hypotension,
poor perfusion, or shock despite adequate
oxygenation and ventilation

**Apneic or pulseless at
any time, follow
[Cardiac Arrest AG](#)**

Age > 1 yr

Age <28 days begin
chest compressions and
refer to [Neonatal
Resuscitation AG](#)

<1 yr begin chest
compressions and refer to
[Cardiac Arrest AG](#)

P	<p><u>First line: administer epinephrine 0.01 mg/kg (1 mg/10 mL) IV/IO</u> Max single dose 1 mg May repeat every 3-5 minutes OR If vagally mediated: administer atropine sulfate: 0.02 mg/kg IV/IO rapid push (min dose 0.1 mg) max initial dose 1 mg May repeat every 3-5 minutes Max total dose 3 mg</p> <p>Administer NS/LR 20 mL/kg IV/IO fluid bolus, assess for signs of fluid overload</p>
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Continued bradycardia
causing ALOC, hypotension,
poor perfusion, or shock (usually <50 BPM)

B Begin chest compressions

Transport according to **SAEMS Critical Pediatric Triage Protocol**
 Notify receiving facility or contact Medical Direction



Education/Pearls

The majority of pediatric bradycardia is caused by respiratory failure and hypoxia. Evaluate for signs of respiratory distress in all pediatric patients. Medication overdose is also a common cause of pediatric bradycardia, often due to unintentional ingestion of parental medications; in the setting of a breastfeeding child, consider overdose or intoxication via maternal breast milk.

- Hypoglycemia, severe dehydration, and opioids may produce bradycardia. Many other agents a child ingests can cause bradycardia, often in a single dose.
- Age appropriate minimal SBP = $70 + (2 \times \text{Age in Years})$

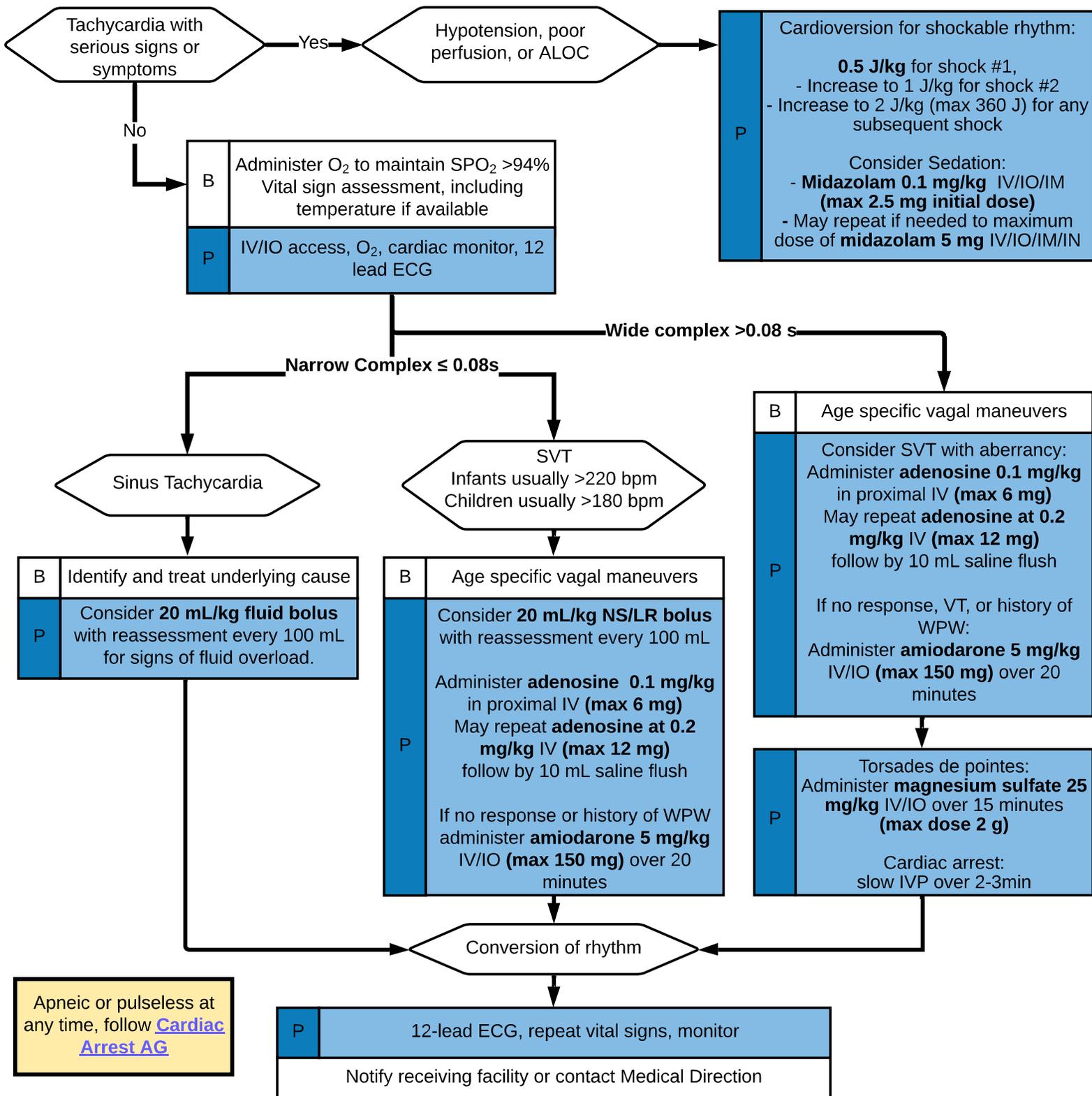
Medications:

- Epinephrine is the drug choice for persistent, symptomatic bradycardia in pediatric patients.
- Atropine:
 - Although atropine is effective in a broader range of patients and provides a greater amount of hemodynamic support, it can cause or worsen bradycardia.
 - It is **second choice in pediatric patients** unless there is evidence of increased vagal tone or a primary AV conduction block. It is safer to use epinephrine in pediatric patients.
 - Increased vagal tone can be caused by nasal or esophageal stimulation, coughing, sleep apnea, esophageal reflux, increased intracranial pressure.
 - The paradoxical effects are the reason for the minimum dose and recommendation for rapid administration.
- Transcutaneous pacing:
 - **Indicated if bradycardia is due to complete heart block or other AV blocks which are not responsive to oxygenation, ventilation, chest compressions, or medications.**
 - **Indicated with known congenital or acquired heart disease.**
 - Not indicated for asystole or bradycardia due to postarrest hypoxic / ischemic myocardial insult or respiratory failure.

Pediatric Tachycardia Administrative Guideline (Age < 14)



History <ul style="list-style-type: none"> • Past medical history • Medications or Toxic Ingestion • Drugs (nicotine, cocaine) • Congenital Heart Disease • Respiratory Distress • Syncope or Near Syncope 	Signs and symptoms <ul style="list-style-type: none"> • Heart rate: (child >180/bpm, Infant > 220/bpm) • Pale/cyanotic/diaphoretic • Hypotension/ALOC • Pulmonary congestion/tachypnea • Syncope 	Differential <ul style="list-style-type: none"> • Heart disease (Congenital) • Hypo/hyperthermia • Hypovolemia or anemia • Anxiety/pain/emotional stress • Fever/infection/sepsis • Hypoxia, hypoglycemia • Medication / Toxin / Drugs (see HX) • Trauma
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Education/Pearls

Children may present atypically when exhibiting elevated heart rates. Serious signs and symptoms include respiratory distress or failure, signs of shock or poor perfusion (mottled skin, perioral cyanosis), AMS, or sudden collapse with rapid, weak pulse. Generally, the maximum sinus tachycardia rate is (220 - the patient's age in years) beats/minute (bpm). If available, continuous pulse oximetry is indicated for all unstable tachycardias.

Narrow Complex Tachycardia (QRS \leq 0.08 seconds)

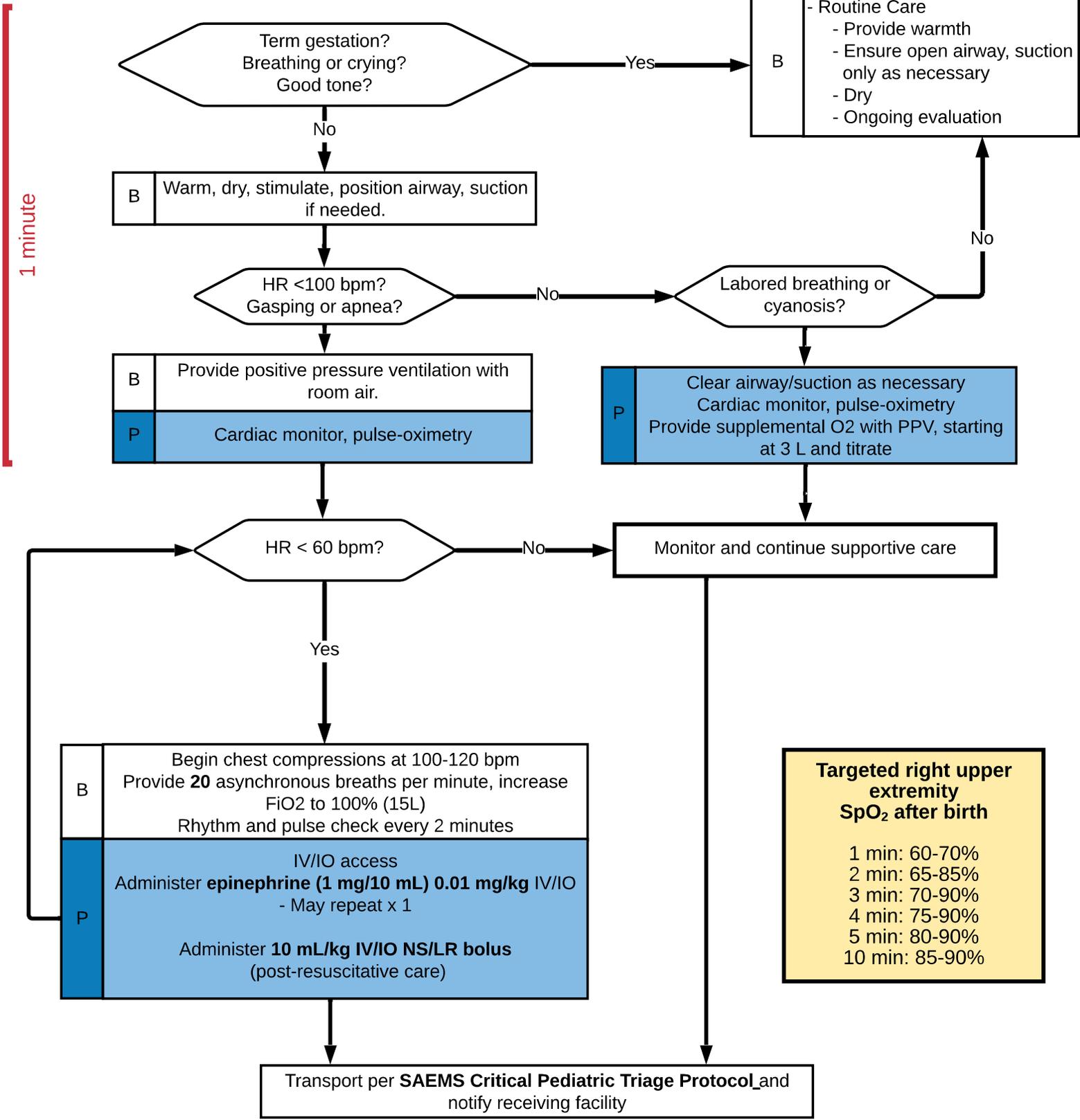
- Sinus tachycardia: P waves present. Variable R-R waves. Infants usually < 220 bpm. Children usually <180 bpm.
- SVT: > 90 % of children with SVT will have a narrow QRS (\leq 0.08 seconds.) P waves absent or abnormal. R-R waves not variable. Usually abrupt onset. Infants usually > 220 bpm. Children usually >180 bpm.
- Atrial Flutter: Will have saw-tooth atrial waves. Rate can vary depending on conduction. May be irregular if variable block/conduction is present.
- Atrial Fibrillation: In children, may represent Wolff-Parkinson-White. Adenosine is **contraindicated**.

Wide Complex Tachycardia (QRS \geq 0.08 seconds):

- SVT with aberrancy - Monomorphic and regular wide complex tachycardia. **May be seen in children with Wolf-Parkinson White (WPW) syndrome. If observed in WPW, the use of adenosine is contraindicated.**
- VT is uncommon in children. Rates may vary from near normal to > 200 bpm. Most children with VT have underlying heart disease, cardiac surgery, long QT syndrome, or cardiomyopathy.
 - **Amiodarone 5 mg/kg over 20-60 minutes** is the recommended agent.
 - The presence of capture or fusion beats is diagnostic.
- Torsades de Pointes (Polymorphic Ventricular Tachycardia):
 - Rate is typically 150 to 250 bpm.
 - Associated with long QT syndrome, hypomagnesaemia, hypokalemia, and many cardiac drugs. May quickly deteriorate to VT.
 - Administer Magnesium Sulfate 25 mg/kg IV or IO over 15 minutes. In cardiac arrest give over 2 minutes.
- 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, using care not to occlude the airway.

Pediatric Notes:

- Separating the child from the caregiver may worsen the child's clinical condition.
- Pediatric paddles should be used in children < 10 kg or Broselow-Luten color Purple if available.
- Monitor for respiratory depression and hypotension associated if Midazolam is used to facilitate cardioversion.
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.



Targeted right upper extremity SpO ₂ after birth	
1 min:	60-70%
2 min:	65-85%
3 min:	70-90%
4 min:	75-90%
5 min:	80-90%
10 min:	85-90%



Education/Pearls

- Wait at least 30-60 seconds post delivery before clamping and cutting the umbilical cord.
- Warm, dry, and stimulate baby for 30 seconds.
- Wrap infant in a dry towel and keep as warm as possible during the resuscitation. Keep the head covered if possible. If gestational age < 32 weeks, additional warming measures are recommended (plastic wrap or bag).
- If strong cry, regular respiratory effort and good tone are present and the infant is term gestation, place infant skin to skin with mother.
- If weak cry, signs of respiratory distress, or poor tone are present, or the infant is preterm gestation, then position airway (sniffing position) and clear airway as needed. If thick meconium, signs of respiratory distress, or secretions are present then suction mouth and nose.
- Consider checking blood glucose for ongoing resuscitation, maternal history of diabetes, if the infant is ill-appearing, or if the infant is unable to feed. Refer to **Hypoglycemia/Hyperglycemia AG** as needed.
- Neonates should not receive naloxone due to concern for precipitation of acute withdrawal and seizures.

First 30-60 seconds:

If heart rate > 100 beats per minute:

- Monitor for signs of respiratory distress. If apneic or in significant respiratory distress, initiate BVM with room air at 10 breaths per minute.

If heart rate < 100 beats per minute:

- Initiate BVM ventilations with room air at 10 breaths per minute while monitoring heart rate closely.
- If no improvement after 90 seconds, begin augmenting O₂ delivery at 3L, increasing every 30 seconds until HR > 100 bpm.

If heart rate < 60 beats per minute:

- Ensure effective ventilations with supplementary oxygenation.
- If no improvement after 30 seconds, initiate chest compressions.
- Initiate BVM ventilations at 20 breaths per minute.

Epinephrine is indicated if the newborn's heart rate remains less than 60 beats per minute after at least 30 seconds of positive pressure ventilation, and another 60 seconds of chest compressions with positive pressure ventilation administered with 100% FiO₂.

Neonatal transportation destinations:

- BUMC-T
- TMC

For parents requesting to refuse neonatal resuscitation or transport thereafter, call medical direction.