SECTION: PC-3

PROTOCOL TITLE: PEDIATRIC Tachycardia

REVISED: August 1, 2013

**BLS SPECIFIC CARE:** See General Pediatric Care Protocol PC-1
- Determine patient’s color category on length based resuscitation tape (Broselow Tape if available)

**ILS SPECIFIC CARE:** See General Pediatric Care Protocol PC-1

**ALS SPECIFIC CARE:** See General Pediatric Care Protocol PC-1

- If Unstable/ poor perfusion: Obtain a 12-lead if possible, otherwise proceed directly to synchronized cardioversion
- Consider underlying causes and treat as well
- See Protocol P-10 for sedation prior to cardioversion

*Narrow Complex Tachycardia* (Supraventricular, QRS $< 0.08$ sec, and regular):
- Vagal Maneuvers
- Adenosine
  - IV or IO: First dose: $0.1 \text{ mg/kg}$ maximum: $6 \text{ mg}$
  - Subsequent doses: $0.2 \text{ mg/kg}$, maximum: $12 \text{ mg}$. Repeat once
- Diltiazem
  - IV/ IO: $0.25 \text{ mg/kg}$ IV over 2 minutes (Usual dose about 20 mg)
  - May repeat in 15 minutes @ $0.35 \text{ mg/kg}$ IV over 2 minutes.
  - Hold for WPW

- If unsuccessful, yet stable, contact medical control for further instructions. If unstable, proceed to synchronized cardioversion
- Assume non-cardiac causes of any tachycardia in infant patients presenting with heart rates $< 220$ bpm and child patients with heart rates $< 180$ bpm
- Maintain patent airway as necessary to include endotracheal intubation when appropriate
- Obtain 12-lead if time allows
- For hemodynamically **UNSTABLE** patients presenting with narrow or wide complex tachycardias, perform immediate synchronized DC cardioversion
  - In the pediatric patient population, a narrow QRS complex is defined as a complex with duration of $< 0.08$ sec (2 mm.)
Consider sedation prior to cardioversion if it will not cause unnecessary delays

**DO NOT** administer if:
- Signs and symptoms of shock are present
- Low respiratory rate, SpO2 and/or diminished mental status

- Versed (midazolam)
  - 0.05 mg/kg to a maximum dose of 2.5 mg IV/IO

**Synchronized DC cardioversion**
- Initial energy setting of 0.5 J/kg or as per manufacturer’s recommendations
- Deliver subsequent shocks, as needed, at 1 J/kg or as per manufacturer’s recommendations

- For hemodynamically **STABLE** patients presenting with narrow complex tachycardias, vagal maneuvers and antidysrhythmic therapy are indicated

**Antidysrhythmic**
- **Adenocard (adenosine):**
  - **DO NOT** administer to irregular tachycardias.
  - 0.1 mg/kg rapidly
  - Maximum initial dose of 6 mg
  - Use two syringe technique
  - If dysrhythmia is not terminated, repeat one more time at double the dose (0.2 mg/kg)
  - Maximum second dose of 12 mg
  - Use two syringe technique
  - Follow each dose with a flush of at least 20 ml

- **Cardizem (diltiazem):***
  - 0.25 mg/kg followed by 0.35 mg/kg in 15 minutes IV/IO

**Wide Complex Tachycardia** (QRS ≥ 0.08sec, Variable R-R)
- **Lidocaine**
  - IV or IO: 1 mg/kg
  - Repeat every 3-5 minutes to a max dose of 3 mg/kg.

- **Amiodarone**
  - IV or IO: 5 mg/kg over 20-60 min. May repeat dose up to 15 mg/kg (max 300 mg).

- If unsuccessful, yet stable, contact medical control for further instructions. If unstable, proceed to synchronized cardioversion.
**Synchronized Cardioversion**
- Settings for synchronized Cardioversion:
  - 0.5 J/kg with subsequent shocks set at 1 J/kg
  - Ensure “SYNC” button is pressed between each desired synchronized shock
- Assume non-cardiac causes of any tachycardia in infant patients presenting with heart rates < 220 bpm and child patients with heart rates < 180 bpm
- Maintain patent airway as necessary to include endotracheal intubation when appropriate
- Obtain 12-lead if time allows
- For hemodynamically unstable patients presenting with wide or narrow complex tachycardias, perform immediate synchronized DC cardioversion
  - In the pediatric patient population, a wide QRS complex is defined as a complex with duration of > 0.08 sec (2 mm)
- Consider sedation prior to cardioversion if it will not cause unnecessary delays

**DO NOT** administer if:
- Signs and symptoms of shock are present
- Low respiratory rate, SpO2 and/or diminished mental status
- Versed (midazolam):
  - 0.05 mg/kg to maximum single dose of 2.5 mg. IV/IO

**Synchronized DC cardioversion:**
- Initial energy setting of 0.5 J/kg or as per manufacturer’s recommendations
- Deliver subsequent shocks, as needed, at 1 J/kg or as per manufacturer’s recommendations
- If unable to obtain synchronization with QRS complexes, (as with torsades de pointes) proceed with **unsynchronized** cardioversion as detailed below

**Unsynchronized DC cardioversion:**
- For unstable torsades de pointes (polymorphic wide complex tachycardia)
  - Use unsynchronized defibrillation energy settings
  - Initial energy setting of 2J/kg or as per manufacturer’s recommendations
  - Deliver subsequent shocks, as needed, at 4 J/kg or as per manufacturer’s recommendations
For hemodynamically STABLE patients presenting with wide complex tachycardias, antidysrhythmic therapy is indicated

**Antidysrhythmic therapy:**
- **Lidocaine IV/IO/ETT:**
  - 1 mg/kg initial bolus
  - Repeat every 5-10 minutes to a maximum of 3 mg/kg
- **Magnesium sulfate:** IV/IO
  - First line agent in treatment of hemodynamically stable polymorphic wide complex tachycardia (torsades de pointes)
  - Also indicated in treatment of refractory VF, wide complex tachycardia in the presence of suspected hypomagnesemia and life threatening ventricular dysrhythmias due to suspected digitalis toxicity
  - 25-50 mg/kg (to a maximum of 2 g) over 10 minutes
  - Rapid administration of magnesium sulfate can cause hypotension and respiratory depression. Carefully monitor both during infusion
  - **To prepare:**
    - Dilute calculated quantity of magnesium sulfate to 50 ml with NS in burette of Metriset
    - Start infusion with roller-clamp half open and titrate to rate of approximately 5 ml/minute

**PHYSICIAN PEARLS:**

- Amiodarone is contraindicated if the patient is suspected of a TCA overdose. This also applies to other drugs that widen the QRS

Use of a vagal maneuver may be useful in determining type of rhythm.

**QRS Width:**
- \( \leq 0.08 \) seconds – probable Sinus Tachycardia or Supraventricular Tachycardia
- \( \geq 0.08 \) seconds – probable Ventricular Tachycardia

**Rate:** (rates less than 180 BPM in a child, or 220 infant are usually secondary to other non-cardiac causes)
- < 180 in Children or < 220 BPM in Infants with regular R-R: Probable Sinus Tach.
- > 180 in Children or > 220 BPM in Infants with regular R-R: SVT
- > 180 in Children or > 220 BPM in Infants with Variable R-R pattern: VT