Tachycardia-Pediatric

Aliases

Supraventricular tachycardia (SVT), ventricular tachycardia (VT), multifocal atrial tachycardia (MAT), torsades, atrial fibrillation (A-FIB), atrial flutter

Patient Care Goals

1. Maintain adequate oxygenation, ventilation, and perfusion.
2. Control ventricular rate.
3. Restore regular sinus rhythm in unstable patient.
4. Search for underlying cause:
    a. Medications (caffeine, diet pills, thyroid, decongestants)
    b. Drugs (cocaine, amphetamines)
    c. History of dysrhythmia
    d. CHF

Patient Presentation

Elevated heart rate for age with or without associated symptoms such as palpitations, dyspnea, chest pain, syncope/near-syncope, hemodynamic compromise, altered mental status, or other signs of end organ dysfunction.

Inclusion Criteria

Heart rate greater than 150 bpm in adolescent or relative tachycardia in pediatric patients (220 infant/180 child)

Exclusion Criteria

Sinus tachycardia

Patient Management

Assessment, Treatments, and Interventions

a. Manage airway as necessary.
b. Administer oxygen ***[EMR]*** as appropriate for dyspnea or distress with a target of achieving greater than 93% saturation for most acutely ill patients.
c. Initiate monitoring and perform 12-lead ECG
d. Establish IV/IO access ***[AEMT].***
e. Check blood glucose ***[EMR]*** and treat hypoglycemia per the Hypoglycemia guideline.
f. Consider the following additional therapies if tachycardia and symptoms or hemodynamic instability continue:
    i. **Regular Narrow Complex Tachycardia—Stable (SVT)**
        1. Perform vagal maneuvers ***[PARA]***.
        2. Administer **Adenosine *[PARA].***
            a. **0.1mg/kg IV/IO (maximum of 6mg), may repeat at 0.2mg/kg (maximum of 12 mg), as needed up to three doses total**
            b. If no effect with 0.1mg/kg followed by 0.2mg/kg dose do not need to administer additional 0.2mg/kg dose but may be administered if clinically appropriate
    ii. **Regular Narrow Complex Tachycardia—Unstable**
        1. Deliver a synchronized shock ***[PARA]***: 0.5-1 J/kg for the first dose.
        2. Use 2 J/kg for repeat doses.
    iii. **Regular, Wide Complex Tachycardia—Stable**
        1. Consider **Adenosine *[PARA]*** for SVT with aberrancy.
            a. **0.1mg/kg (maximum of 6mg), may repeat at 0.2mg/kg (maximum of 12**

mg IV), as needed up to three doses total

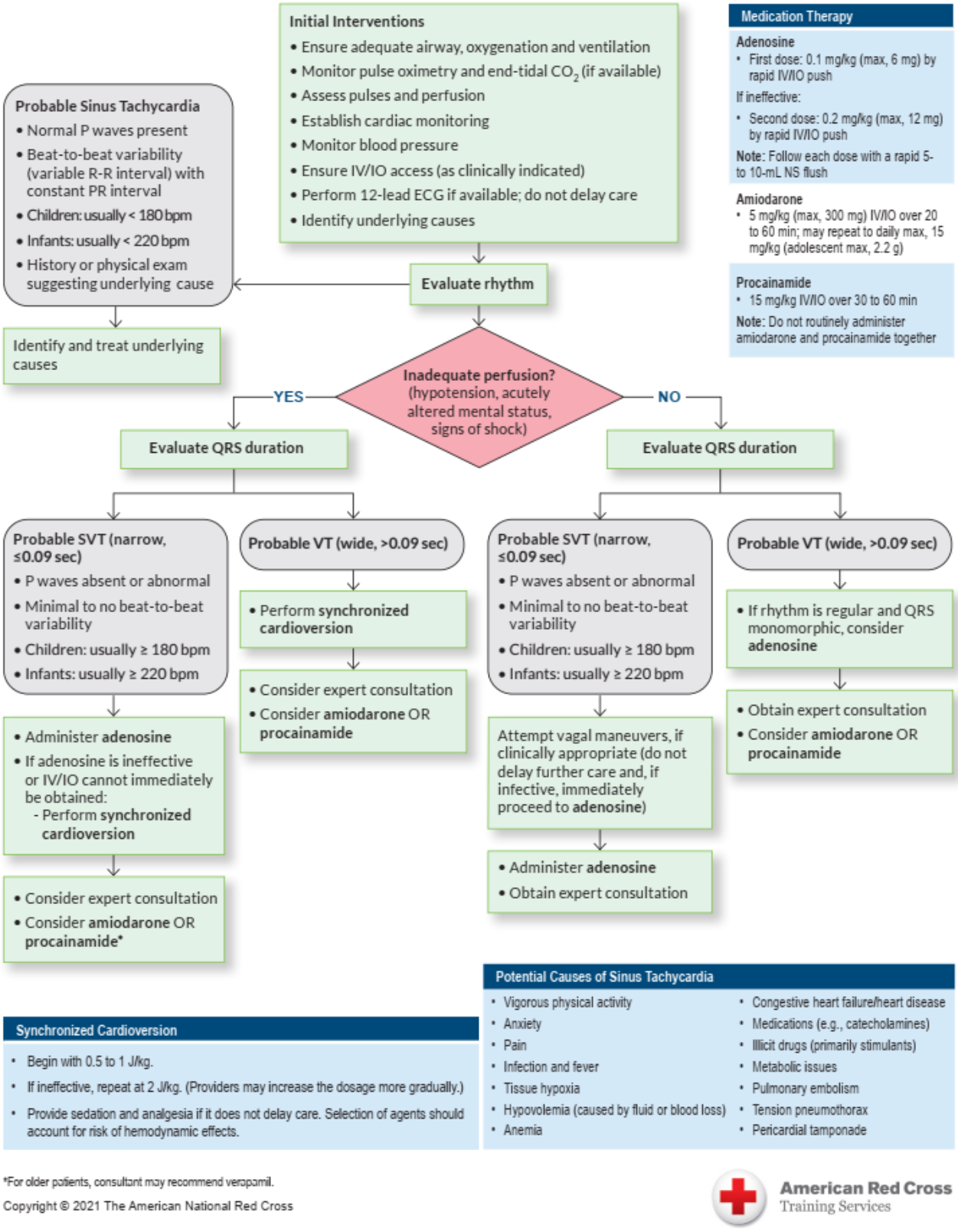
2. **Amiodarone over 20 minutes *[PARA]***
    a. **5mg/kg IV/IO (max of 150mg) over 20 minutes. May repeat twice, max total 15mg/kg**

iv. **Regular, Wide Complex Tachycardia – Unstable**

1. Synchronized cardioversion 0.5-1.0 J/kg ***[PARA]***

PEDIATRIC TACHYCARDIA WITH A PULSE

PALS - 2020 VERSION



Notes and Educational Pearls Key Considerations

- Causes:
  - Hypovolemia
  - Hypoxia
  - Hydrogen (acidosis)
  - Myocardial infarction

        - Hypokalemia or hyperkalemia
        - Hypoglycemia
        - Hypothermia
        - Toxins or Overdose
        - Tamponade
        - Tension pneumothorax
        - Thrombus—central or peripheral
        - Trauma
        - Hyperthyroidism
- Atrial fibrillation rarely requires cardioversion in the field. As it is difficult to ascertain onset of rhythm, risk of stroke needs to be considered prior to cardioversion.
- A wide-complex irregular rhythm should be considered pre-excited atrial fibrillation; extreme care must be taken in these patients.
    - Characteristic ECG findings include a short PR interval and, in some cases, a delta wave.
    - Avoid AV nodal blocking agents such as adenosine, calcium channel blockers, digoxin, and possibly beta-blockers in patients with pre-excitation atrial fibrillation (e.g. Wolff-Parkinson-White Syndrome, Lown-Ganong-Levine Syndrome) because these drugs may cause a paradoxical increase in the ventricular response.
    - Blocking the AV node in some of these patients may lead to impulses that are transmitted exclusively down the accessory pathway, which can result in ventricular fibrillation.
    - Amiodarone or procainamide may be used as an alternative.
- Amiodarone or procainamide can be used as a rate-controlling agent for patients who are intolerant of or unresponsive to other agents, such as patients with CHF who may not otherwise tolerate diltiazem or metoprolol.
- Studies in infants and children have demonstrated the effectiveness of adenosine for the treatment of hemodynamically stable or unstable SVT.
- Adenosine should be considered the preferred medication for stable SVT.
    - Verapamil may be considered as alternative therapy in older children but should not be routinely used in infants.
    - Procainamide or amiodarone given by a slow IV infusion with careful hemodynamic monitoring may be considered for refractory SVT.

Pertinent Assessment Findings

No recommendations

Patient Safety Considerations

- Only use one anti-dysrhythmic at a time.
- Patients who receive metoprolol and diltiazem are at significant risk for hypotension and bradycardia.
- If using cardioversion, consider sedation and pain control.
- With irregular wide complex tachycardia (atrial fibrillation with aberrancy such as Wolff-Parkinson-White and Lown-Ganong Levine), avoid use of AV nodal blocking agents (e.g. adenosine, calcium channel blockers, beta blockers).
- Patients with Wolff–Parkinson–White should be given procainamide prior to amiodarone.

Quality Improvement

Associated NEMSIS Protocol(s) (eProtocol.01)

- 9914199—Medical-Tachycardia
- 9914151—Medical-Ventricular Tachycardia (With Pulse)
- 9914147—Medical-Supraventricular Tachycardia (Including Atrial Fibrillation)

Key Documentation Elements

- Initial rhythm and all rhythm changes
- Time, dose and response to medications given
- Cardioversion times, synchronization, attempts, joules and response
- Obtain monitor strips after each intervention
- Patient weight
- Pediatric length-based tape color (for pediatrics who fit on tape)
- History of event supporting treatment of underlying causes

Performance Measures

- Time to clinical improvement from patient contact
- Blood sugar obtained
- Correct medication(s) and dose given for patient condition, age, and weight
- Correct cardioversion joules delivered given patient weight and/or condition
- Use of sedation for responsive patient

EMS Compass® Measures (for additional information, see www.emscompass.org)

- *PEDS-03: Documentation of estimated weight in kilograms.* Frequency that weight or length-based estimate are documented in kilograms
- *Hypoglycemia-01: Treatment administered for hypoglycemia.* Measure of patients who received treatment to correct their hypoglycemia

References

1. DeSouza IS, Martindale JL, Sinert R. Antidysrhythmic drug therapy for the termination of stable, monomorphic ventricular tachycardia: a systematic review. *Emerg Med J.* 2015;32(2):161-7.
2. Fengler BT, Brady WJ, Plautz CU. Atrial fibrillation in the Wolff-Parkinson-White Syndrome: ECG recognition and treatment in the ED. *Am J Emerg Med.* 2007;25(5):576-83.
3. Fuster V, Rydén LE, Cannom DS, et al. [ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation – executive summary]. *Rev Port Cardiol*. Apr;26(4):383-446.
4. Link MS, Berkow LC, Kudenchuk HR, et al. Part 7: adult advanced cardiovascular life support. *Circulation*. 2015;132(18 Suppl 2):S444-64.
5. Long B, Koyfman A. Best clinical practice: emergency medicine management of stable monomorphic ventricular tachycardia. *J Emerg Med*. Epub 2016 Oct 15.
6. McNamara RL, Tamariz LJ, Segal JB, Bass EB. Management of atrial fibrillation: review of the evidence for the role of pharmacologic therapy, electrical cardioversion, and echocardiography. *Ann Intern Med.* 2003;139(12):1018-33.
7. Ortiz M, Martin A, Arribas F, et al. Randomized comparison of intravenous procainamide vs. intravenous amiodarone for the acute treatment of tolerated wide QRS tachycardia: the PROCAMIO study. *Eur Hear J*. 2017;38(17):1329-35.
8. Somberg JC, Bailin SJ, Haffajee CI, et al. Intravenous lidocaine versus intravenous amiodarone (in a new aqueous formulation) for incessant ventricular tachycardia. *Am J Cardiol.* 2002;90(8):853-9.
9. Wann LS, Curtis AB, January CT, et al. 2011 ACCF/AHA/HRS focused update on the management of patients with atrial fibrillation (updating the 2006 guideline): a report of the American College of Cardiology Foundation/American Heart Association task force on practice guidelines. *Circulation. 2011;123:104-23*.
10. Zimetbaum P, Reynolds MR, Ho KK, et al. Impact of a practice guideline for patients with atrial fibrillation on medical resource utilization and costs. *Am J Cardiol*, 2003;92(6):677-81.