A. The 2015 American Heart Association Guidelines were referred to for this protocol development. Evidence-based science was implemented in those areas where the AHA guidelines were out of date or incomplete
   1. Infant is up to one year of age.
   2. Child is one year to puberty or adolescence (about 12-14 years old)
   3. Adult is older than puberty / adolescence

B. ECG and rhythm information should be interpreted within the context of total patient assessment. Must evaluate the patient’s symptoms and clinical signs, including ventilation, oxygenation, heart rate, blood pressure, level of consciousness, and signs of inadequate organ perfusion.

C. **Unstable** and **symptomatic** are terms that can be used to describe the condition of patients with dysrhythmias
   1. Unstable means vital organ function is acutely impaired or cardiac arrest is ongoing or imminent. As evidenced by acutely altered mental status, ischemic chest discomfort, acute heart failure, hypotension, or other signs of shock that persist despite adequate airway and breathing management.
      • Immediate intervention is indicated
   2. Symptomatic implies that the dysrhythmia is causing symptoms, such as palpitations, lightheadedness, or dyspnea, but the patient is stable and not in imminent danger.
      • More time is available to decide on the most appropriate intervention.

D. Assess whether or not it is the arrhythmia that is making the patient unstable or symptomatic

**Basic EMT**

A. Assess and manage airway
   1. Administer oxygen as needed to treat shock and/or respiratory distress
   2. Apply pulse oximeter and treat per pulse oximeter procedure

B. Evaluate patient’s general appearance, relevant history of condition and determine **OPQRSTI** and **SAMPLE**. Especially ask about cardiac history.

C. **Pediatric Bradycardia (with pulse)** - Assess for cardiopulmonary compromise: hypotension, acutely altered mental status and/or signs of shock
   1. If no signs of cardiopulmonary compromise:
      a. Support ABCs
      b. Administer oxygen per Pulse Oximeter Procedure
      c. Monitor and transport
   2. If patient exhibits signs of cardiopulmonary compromise despite appropriate oxygenation and ventilation:
      a. Begin CPR per AHA guidelines. CCR does not apply to children.

D. Contact Medical Control and transport. Consider ALS intercept, especially if patient is symptomatic or unstable.
A. Apply cardiac monitor and determine dysrhythmia:
   1. Sinus Tachycardia – rule out and treat underlying cause
   2. All other rhythms – monitor

B. Start IV NS, KVO

C. Contact Medical Control and transport. Consider ALS intercept, especially if patient is symptomatic or unstable.

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**Paramedic**

A. **Adult Bradycardia (with pulse)** – when the bradycardia is the cause of symptoms, the rate is generally < 50 beats per min.
   1. Maintain patent airway; assist breathing as necessary
   2. Administer oxygen per Pulse Oximeter Procedure
   3. Establish IV access, NS, TKO
   4. Obtain 12-lead ECG
   5. If patient is stable, continue to monitor and transport
   6. If patient is unstable (e.g., acutely altered mental status, ischemic chest discomfort, acute heart failure, hypotension, or other signs of shock that persist despite adequate airway and breathing management):
      a. 1st intervention is *Atropine* 0.5 mg IVP every 3-5 minutes until stable or to a maximum dose of 3 mg.
         a. Use atropine cautiously with AMI or ischemia. Increased heart rate may worsen ischemia or increase infarct size
         b. Atropine will likely not be effective in patients with cardiac transplantation
         c. Type II second-degree or third-degree AV blocks likely won’t respond to atropine and are preferably treated with transcutaneous pacing
      b. Transcutaneous Pacing (TCP)
         a. For unstable patients who do not respond to atropine
         b. Immediate TCP may be considered for patients with high-degree AV block when IV access not available
         c. Consider procedural sedation if SPB > 100 mmHg, but do not delay pacing. See Procedural Sedation Protocol
         d. Set the rate to 80 beats per minute and 20 milliamperes (ma). Increase by 20 ma every 10 seconds until electrical and mechanical capture obtained.
         e. For continued transcutaneous pacing, if systolic BP improves and remains > 100 mmHg may administer Morphine 2 – 5 mg slow IVP

7. Suspected Beta Blocker Overdose
   a. Can cause significant bradycardia and hypotension
   b. Apply cardiac monitor; treat dysrhythmias per Dysrhythmia Protocol
   c. If bradycardic but normal BP, close monitoring only
   d. If hypotensive, start with NS IVF bolus
   e. If hypotensive AND bradycardic, give Atropine 1mg IV, repeat in 5 mins as needed for bradycardia
f. If hypotension persists despite fluids, give **Glucagon 5 mg IV** over 5 minutes. If no effect in 10 minutes, repeat the dose. Be prepared to treat vomiting.

8. Suspected Calcium Channel Blocker Overdose  
   a. Can cause significant bradycardia and hypotension  
   b. Apply cardiac monitor; treat dysrhythmias per Dysrhythmia Protocol  
   c. If bradycardic but normal BP, close monitoring only  
   d. If hypotensive, start with NS IVF bolus  
   e. If hypotensive AND bradycardic, give Atropine 1mg IV, repeat in 5 mins as needed for bradycardia  
   f. If hypotension persists despite fluids, give **Calcium gluconate 3g IV** slow push. If no effect in 10 minutes, dose should be repeated  
   g. If hypotension persists despite IV Calcium gluconate, then give Glucagon 5 mg IV over 5 minutes. If no effect in 10 minutes, repeat the dose. Be prepared to treat vomiting.

B. **Pediatric Bradycardia (with pulse)** - Assess for cardiopulmonary compromise: hypotension, acutely altered mental status and/or signs of shock  
   1. If no signs of cardiopulmonary compromise:  
      a. Support ABCs  
      b. Administer oxygen per Pulse Oximeter Procedure  
      c. Monitor and transport  
   2. If patient exhibits signs of cardiopulmonary compromise despite appropriate oxygenation and ventilation:  
      a. Begin CPR per AHA guidelines  
      b. Reassess after two minutes, if bradycardia and signs of hemodynamic compromise persist or responds only transiently – continue CPR and administer epinephrine 0.01 mg/kg (0.1 ml/kg of 1:10,000 solution) IV/IO; may repeat every 3-5 minutes  
      c. Consider atropine 0.02 mg/kg IV/IO if bradycardia is due to increased vagal tone or primary AV conduction block (i.e., not secondary to factors such as hypoxia). May repeat dose once. Minimum dose is 0.1 mg and maximum single dose is 0.5 mg  
      d. Transport  
   3. Suspected Beta Blocker or Calcium Channel Blocker Overdose  
      a. Can cause significant bradycardias and hypotension  
      b. Apply cardiac monitor; treat dysrhythmias per Dysrhythmia Protocol  
      c. Give normal saline fluid boluses 20 ml/kg for hypotension  
      d. If hypotensive and bradycardic, give Atropine, 0.02 mg/kg IV, repeat in 5 minutes as needed for bradycardia, minimum dose is 0.1 mg  
      e. If it is a known calcium channel blocker overdose, administer IV calcium gluconate 10%, 50mg/kg.  
      f. For beta blocker or calcium channel blocker overdose, administer Glucagon 50 mcg/kg IV/IO. May repeat dose if HR stays < 60

C. **Adult Tachycardia (with pulse)**  
   1. Assess appropriateness for clinical condition (i.e., is the heart rate an appropriate response to an underlying condition like fever, dehydration)  
   2. Heart rates < 150 are unlikely to cause symptoms of instability  
   3. Maintain patent airway; assist breathing as necessary  
   4. Administer oxygen per Pulse Oximeter Procedure
5. If patient is UNSTABLE (e.g., acutely altered mental status, ischemic chest discomfort, acute heart failure, hypotension, or other signs of shock that persist despite adequate airway and breathing management):
   a. Synchronized Cardioversion
      a. Consider procedural sedation if SBP > 100 mmHg, but do not delay cardioversion. See Procedural Sedation Protocol
      b. Initial recommended dose:
         a. Narrow regular (SVT, AFlutter): 50-100 J
         b. Narrow irregular: (AFib) 120-200 J biphasic and 200 J monophasic
         c. Wide regular (VTach): 100 J
         d. Wide irregular (polymorphic QRS, torsades de pointes, VFib): defibrillation dose (NOT synchronized)
         e. If initial shock fails, increase energy in a stepwise fashion
   
6. If patient is STABLE, evaluate width of QRS.
   a. WIDE: If QRS is ≥ 0.12 seconds (or > 3 small boxes):
      a. Obtain 12-lead EKG if available
      b. Administer amiodarone 150 mg diluted in 10-20 ml NS slow IVP over 10 minutes
      c. Consider adenosine only if regular and monomorphic or you’re not certain what the underlying arrhythmia is; Adenosine is NOT a diagnostic measure. Treat wide-complex tachyarrhythmias as VTach until proven otherwise.
      d. If patient becomes unstable at any time proceed with cardioversion
   b. NARROW: If QRS < 0.12 seconds:
      a. Obtain 12 lead EKG if available
      b. SVT: Vagal maneuvers → Adenosine 6 mg rapid IV push → Adenosine 12 mg rapid IV push if unsuccessful. If the patient converts back to NSR but then the SVT recurs later, repeat the last successful dose of adenosine
      c. AFib & AFlutter: Metoprolol 5 mg IV over 2-5 minutes, may repeat Metoprolol dose every 5 minutes to max dose of 15 mg if necessary
      - OR – Diltiazem/Cardizem 0.25 mg/kg IV max 20 mg over 2 minutes, may repeat Diltiazem dose in 15 minutes at 0.35 mg/kg max 20 mg over 2 minutes if necessary
         Patient might stay in AFib or AFlutter, goal is control of the heart rate – ideally 90-110 bpm following medication administration
      d. If patient becomes unstable at any time proceed with cardioversion

D. Pediatric Tachycardia (with pulse) - Assess for cardiopulmonary compromise: hypotension, acutely altered mental status and/or signs of shock
   1. If NO signs of cardiopulmonary compromise:
      a. Support ABCs
      b. Administer oxygen per Pulse Oximeter Procedure
      c. Obtain 12-lead EKG if available to determine QRS width
      d. Monitor and transport
   2. If patient DOES exhibit signs of cardiopulmonary compromise despite appropriate oxygenation and ventilation, evaluate QRS duration / width
   3. NARROW-Complex (QRS ≤ 0.09 seconds) Tachycardia
a. Evaluation of 12-lead EKG, the patient’s clinical presentation and history should help differentiate sinus tachycardia from supraventricular tachycardia (SVT)
b. If rhythm is sinus tachycardia, search for and treat reversible causes.
c. If rhythm is SVT:
   a. Attempt vagal maneuvers first
   b. If IV/IO access is readily available, adenosine is the drug of choice
      a. First dose: 0.1 mg/kg rapid IVP (max first dose 6mg) immediately followed with ≥ 5 ml NS flush
      b. Second dose: 0.2 mg/kg rapid IVP (max second dose 12mg) immediately followed with ≥ 5 ml NS flush
   c. If no IV/IO access or patient does not respond to adenosine, perform synchronized cardioversion
      a. Consider procedural sedation if not hypotensive, but don’t delay cardioversion. See Procedural Sedation Protocol
      b. Start at 0.5 – 1 J/kg; if not effective increase to 2 J/kg
d. Continue to monitor and transport.

4. WIDE-Complex (QRS > 0.09 seconds) Tachycardia:
   a. UNSTABLE - Exhibits signs of cardiopulmonary compromise – Perform synchronized cardioversion.
      a. Consider procedural sedation if not hypotensive, but do not delay Cardioversion. See Procedural Sedation Protocol.
      b. Cardiovert at 0.5 - 1 J/kg; if not effective increase to 2 J/kg
   b. STABLE - Does not exhibit signs of cardiopulmonary compromise
      a. Consider adenosine if rhythm is regular and QRS monomorphic or you’re not sure what the underlying arrhythmia is; Adenosine is not a diagnostic measure. Treat wide-complex tachyarrhythmias as VTach until proven otherwise
      b. Consider amiodarone 5 mg/kg slow IVP over 10 minutes in consultation with online medical control
      c. If patient becomes unstable at any time proceed with cardioversion
**DYSRHYTHMIAS ADULT BRADYCARDIA**

- Assess and manage airway
- Maintain O2 SATS >95%
- Evaluate patient condition
- Monitor vital signs
- Obtain medical history
- Acquire 12 lead ECG
- Reassure patient
- Transport

**UNSTABLE: ALTERED LOC, CHEST PAIN, HEART FAILURE, AND/OR SHOCK**

- Administer ATROPINE 0.5 mg IVP every 3-5 minutes until stable (max dose of 3 mg)
- If patient does not respond to atropine or has a high degree AV block begin TRANSCUTANEOUS PACING (TCP). Set rate to 80 beats per minute and 20 milliamperes. Increase by 20 milliamperes every 10 seconds until electrical and mechanical capture.
- Consider procedural sedation and pain management protocols

**KEY**

<table>
<thead>
<tr>
<th>BASIC EMT</th>
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<tbody>
<tr>
<td>ADVANCED EMT</td>
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<tr>
<td>PARAMEDIC</td>
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<tr>
<td>MED CONTROL</td>
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**THE STABLE PATIENT** with bradycardia should be monitored and transported.

**Suspected beta blocker overdose:**
- Consider Glucagon (Glucagen) 5mg IV push. If hypotension and bradycardia persist despite fluids and atropine.

**Suspected calcium channel blocker overdose:**
- Consider Calcium Gluconate 3g slow IV push. If hypotension and bradycardia persist despite fluids and atropine.
- Consider Glucagon 5mg IV push if calcium is ineffective.
DYSRHYTHMIAS
PEDIATRIC BRADYCARDIA

- Assess and manage airway
- Maintain O2 SATS >95%
- Evaluate patient condition
- Monitor vital signs
- Begin CPR if patient is unstable
- Obtain medical history
- Reassure patient
- Transport

IV NS (Run to maintain perfusion)
- Monitor ECG

UNSTABLE: ALTERED LOC, CHEST PAIN, HEART FAILURE, AND/OR SHOCK

- Reassess after 2 minutes. If bradycardia persists administer epinephrine 0.01 mg/kg (0.1ml/kg of 1:10,000) IVP every 3-5 minutes
- Consider atropine 0.02 mg/kg IVP (if bradycardia is due to increased vagal tone or primary AV conduction block)
  may repeat dose once. Minimum dose is 0.1 mg and maximum dose is 0.5 mg.

THE STABLE PATIENT WITH BRADYCARDIA SHOULD BE MONITORED AND TRANSPORTED.

SUSPECTED BETAG BLOCKER OR CALCIUM CHANNEL BLOCKER OVERDOSE:

- Give normal saline fluid boluses 20 ml/kg for hypotension
- If hypotensive and bradycardic, give atropine, 0.02 mg/kg IV, repeat in 5 minutes as needed for bradycardia, minimum dose is 0.1 mg
- If it is a known calcium channel blocker overdose, administer IV calcium gluconate 10%, 50mg/kg.
- For beta blocker or calcium channel blocker overdose, administer glucagon 50 mcg/kg IV/IO. May repeat dose if HR stays < 60

KEY
- BASIC EMT
- ADVANCED EMT
- PARAMEDIC
- MED CONTROL
**DYSRHYTHMIAS**

**ADULT TACHYCARDIA**

- Assess and manage airway
- Maintain O2 SATS >95%
- Evaluate patient condition
- Monitor vital signs
- Obtain medical history
- Acquire 12 lead ECG
- Reassure patient
- Transport

**UNSTABLE:**

- Altered LOC, chest pain, heart failure, and/or shock

**SYNCHRONIZED CARDIOVERSION** (consider procedural sedation)

**Initial recommended dosages**

<table>
<thead>
<tr>
<th>Type</th>
<th>Initial Recommended Dosage</th>
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<tbody>
<tr>
<td>Narrow, regular (SVT, AFL)</td>
<td>50-100 J</td>
</tr>
<tr>
<td>Narrow, irregular (AFib)</td>
<td>120-200 J BIPhasic 200 MONOPhasic</td>
</tr>
<tr>
<td>Wide, regular (VTach)</td>
<td>100 J</td>
</tr>
<tr>
<td>Wide, irregular (polymorphic QRS, Torsades, Vfib)</td>
<td>DEFIBRILATE 200 J</td>
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<tr>
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<th>Advanced EMT</th>
<th>Paramedic</th>
<th>Med Control</th>
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</table>

- The stable patient with tachycardia should be monitored and transported.

**Wide** - When QRS is ≥ 0.12 seconds (or > 3 small boxes):
- Consider Amiodarone (Cordarone) 150 mg slow IV push.

**Narrow** - If QRS is < 0.12 seconds:
- SVT
  - Vagal maneuvers,
  - Administer Adenosine (Adenocard) 6 mg rapid IV push followed by NS flush if rhythm is regular.
  - Repeat at 12 mg if unsuccessful.
- AFib or Aflutter
  - Administer Metoprolol (Lopressor) 5 mg over 2-5 min. Can repeat every 5 min to max of 15 mg.
  - Or
    - Administer Diltiazem (Cardizem) 0.25 mg/kg IV (20 mg max) over 2 min. Can repeat dose in 15 minutes at 0.35 mg/kg (max 20 mg) if necessary.
**DYSRHYTHMIAS**
**PEDIATRIC TACHYCARDIA**

- Assess and manage airway
- Maintain O2 SATs >95%
- Evaluate patient condition
- Monitor vital signs
- Obtain medical history
- Acquire 12 lead ECG
- Reassure patient
- Transport

**UNSTABLE:**
Alterated LOC, chest pain, heart failure, and/or shock

- IV NS (run to maintain perfusion)
- Monitor ECG

**WIDE COMPLEX TACHYCARDIA OR SVT THAT DOES RESPOND TO ADENOSINE:**
  - Perform **synchronized cardioversion**. Consider procedural sedation and begin with 0.5 – 1 J/kg. If not effective increase to 2 J/kg.

**THE STABLE PATIENT WITH TACHYCARDIA SHOULD BE MONITORED AND TRANSPORTED.**

**IF NARROW (SVT):**
  - Attempt vagal maneuvers first
  - Administer **adenosine (Adenocard)** 0.1 mg/kg rapid IV push (max dose of 6 mg) followed by 5 mL NS flush. Repeat dose is 0.2 mg/kg rapid IV push followed by 5 mL NS flush.

**IF WIDE (VTACH):**
  - Consider amiodarone 5mg/kg slow IV/P over 10 minutes in consultation with online medical control.
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