Bradycardia; Pulse Present

History
- Past medical history
- Medications
  - Beta-Blockers
  - Calcium channel blockers
  - Clonidine
  - Digoxin
- Pacemaker

Signs and Symptoms
- HR < 60/min with hypotension, acute altered mental status, chest pain, acute CHF, seizures, syncope, or shock secondary to bradycardia
- Chest pain
- Respiratory distress
- Hypotension or Shock
- Altered mental status
- Syncope

Differential
- Acute myocardial infarction
- Hypoxia / Hypothermia
- Pacemaker failure
- Sinus bradycardia
- Head injury (elevated ICP) or Stroke
- Spinal cord lesion
- Sick sinus syndrome
- AV blocks (1°, 2°, or 3°)
- Overdose

Heart Rate < 60 / min and Symptomatic:
Ischemic Chest Pain, Hypotension, MI, Syncope, or Acute CHF
Typically HR < 50/ min

Heart Rate < 60 / min and Severe Symptoms:
Altered Mental Status, Seizures, Shock, or Impending Cardiac Arrest
Typically HR < 50/ min

Start Transcutaneous Pacing Procedure
Administer Atropine and Epinephrine
Start all simultaneously

- Airway Protocol(s) AR 1, 2, 3 ***if indicated***
- Respiratory Distress Protocol AR 4 ***if indicated***
- Chest Pain: Cardiac and STEMI Protocol AC 4 ***if indicated***
- **B** Search for Reversible Causes
- **B** 12 Lead ECG Procedure
- IV / IO Protocol UP 6
- **P** Cardiac Monitor
- **A** **Normal Saline Fluid Bolus**
  500 mL – 2 L NS IV / IO
  (Unless Acute CHF)
  Maximum 2 L
- **P** **Atropine 1 mg IV / IO**
  May repeat every 3 – 5 minutes
  Maximum 3 mg
- **P** **Push Dose**
  Epinephrine 5 mcg/min IV / IO
  May repeat every 2 - 3 minutes
  Titrate to SBP ≥ 90 mmHg or MAP ≥ 65 mmHg
- **P** **Epinephrine 1 - 10 mcg/min IV / IO**
  Titrate to SBP ≥ 90 mmHg or MAP ≥ 65 mmHg
- **P** **If No Improvement**
  Transcutaneous Pacing Procedure
  (Consider earlier in 2nd or 3rd AVB)

Reversible Causes

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypothermia
Hypo / Hyperkalemia

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

Suspected Hyperkalemia

Calcium Gluconate 2 gm IV / IO

Suspected Beta-Blocker or Calcium Channel Blocker

Follow Overdose/ Toxic Ingestion Protocol TE 7

P Consider Sedation
Midazolam 2 - 2.5 mg
IV / IO / IM / IN
Maximum 10 mg

Notify Destination or Contact Medical Control

Adult Cardiac Protocol Section

Bradycardia; Pulse Present

ECG and rhythm information should be interpreted in context of the entire patient assessment.

- For example, if you have a patient who is ill with a likely infection and is bradycardic, overall symptoms are unlikely related to bradycardia and more likely related to overwhelming sepsis and potentially hypoxia.

Hypoxemia is a common cause of bradycardia and bradycardic cardiac arrest.

Bradycardia is defined as heart rate < 60, but rarely causes symptoms unless < 50 in the adult. The most important decision point in care is whether the patient is stable or unstable.

Atropine:

- First line agent for most bradycardia
- Do not use in 3d AVB
- Do not use in Wide Complex Rhythm

Unstable:

- Refers to patient condition in which a vital organ function is acutely impaired.

Impending Cardiac Arrest:

- Severe vital organ dysfunction, altered mental status, hypotension/shock/poor perfusion with cardiac arrest imminent.

Symptomatic:

- Symptomatic implies the arrhythmia is causing the presenting symptoms, but the patient may be stable and not in imminent danger. This situation allows you more time to decide on the most appropriate intervention which often is supportive care only.

Push-Dose Vasopressors:

- **Epinephrine:** Mix 1:1000 (1mg in 1mL) into 1000 mL of NS or LR.
- Yields a concentration of 1 mcg/mL of Epinephrine.
- Use a 10 drop set so 50 gtts/minute = 5 mcg/minute – see table to right.

Epinephrine and Norepinephrine DRIP

1 mg of drug in 1000 mL NS or LR
(1 mcg / mL)
10 drop set

Dose	gtts / min
1 mcg/min	10 gtts/min
2 mcg/min	20 gtts/min
3 mcg/min	30 gtts/min
4 mcg/min	40 gtts/min
5 mcg/min	50 gtts/min
6 mcg/min	60 gtts/min
7 mcg/min	70 gtts/min
8 mcg/min	80 gtts/min
9 mcg/min	90 gtts/min
10 mcg/min	100 gtts/min

Bradycardia and Symptomatic Arm of Protocol:

- **Give Epinephrine 5 mcg every 2 – 3 minutes** to effect SBP ≥ 90 and/or MAP of ≥ 65 mmHg.
- **If TCP is needed set HR at 70 BMP and mA to 70 and titrate mA up to gain capture.**

Bradycardia with Severe Symptoms/Impending Cardiac Arrest Arm of Protocol:

- **Give Epinephrine 10 mcg every 2 – 3 minutes** to effect SBP ≥ 90 and/or MAP of ≥ 65 mmHg
- **TCP: set HR at 70 BMP and mA to 200. As patient improves, and/or as time allows, you may decrease the mA down if patient is experiencing pain related to pacing.**

Pearls

- **Recommended Exam: Mental Status, Neck, Heart, Lungs, Neuro**
- **Identifying signs and symptoms of poor perfusion caused by bradycardia are paramount.**
- **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.**
- **Hypoxemia is a common cause of bradycardia. Ensure oxygenation and support respiratory effort.**
- **Atropine:**
  - **Atropine is considered a first line agent in symptomatic bradycardia.**
  - **Ineffective and potentially harmful in cardiac transplantation. May cause paradoxical bradycardia or asystole.**
- **Symptomatic bradycardia causing shock or peri-arrest condition:**
  - **If no IV or IO access immediately available, start Transcutaneous Pacing and continue obtaining IV or IO access.**
  - **Administer Atropine and Epinephrine and start Transcutaneous Pacing simultaneously.**
- **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.**
  - **Begin immediate TCP with high-degree AV block (2d or 3d degree) with no IV / IO access while establishing IV / IO access to initiate pharmaceutical therapy.**
- Consider treatable causes for bradycardia (Beta Blocker OD, Calcium Channel Blocker OD, etc.)