Palpitations/Arrhythmias

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Goals

• Understand the basic approach to arrhythmias in the Urgent Care setting
  – Identification and triage
• Identify specific details on initial management and stabilization
• Review examples of real cases for application into practice

Electrocardiogram

• 12 lead ECG is essential for diagnosis, documentation and treatment
• Monitors, alone, are not adequate and can be misleading
• Compare a minimum of 2 leads to reduce any possible artifact

Electrocardiogram

• Arrhythmias in the urgent care setting are very common and mostly benign.
• However, serious fatal rhythms may occur.
• The sensation of palpitations is a very common general symptom. Most of the time a routine ECG will give a definite diagnosis or cause. But is it indicated?
• There is an accumulated body of evidence that outpatient ECGs should be stored or transmitted to a central station for correct documentation. We currently use the MUSE software.
• Automated readings of ECGs do not always carry an accurate diagnosis.
  – example: “digitalis effect”
• The clinical picture and presentation will determine the course and management.

Electrocardiogram

• Routine ECGs at the time of the complaint can carry a 30-60% variability in determining the diagnosis.
• The key to accurately diagnosing and treating arrhythmias is having a reasonable knowledge of ECGs along with relating the clinical presentation to laboratory findings.
• There is no indication to perform screening ECGs in the setting of nonspecific symptoms (except in special circumstances).
• The recommendation from the American College of Cardiology and the American Heart Association emphasize that ECGs should be done for validation of arrhythmias during the clinical presentation.

ECG Chest Leads

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**ECG Waveforms**

- 0.20 SECONDS
- 1.0 M VOLTS

**Electrocardiogram - Normal**

**Artifacts**

**Premature Ventricular Contraction**

**Bigeminy**

**Management of Arrhythmias in Urgent Care:**

Initial rapid assessment and triage:
- Any tachycardia should be taken seriously
  - To a lesser degree for sinus tachycardia in anxiety, dehydration
- Vital signs determine the severity index for rapid triage
- Rapid triage should focus on medical history highlights
- Management
  - Acute bed with cardiac monitor and equipped with DC pads
  - Initiate ABC protocol
  - IV access
Management of Arrhythmias in Urgent Care:

Provider History and Exam:
- Concurrent clinical history
  - Chest pain, SOB, Syncope, etc.
- Triggers/Causes for clinical picture
- Exam
  - Focus on Neuro- Cardiac- Pulmonary findings

Diagnostics:
- ECG & continuous cardiac monitor
- Electrolytes
- Cardiac enzymes
- BNP/NT BNP
- Digoxin level
- ± UDS
- Imaging
  - CXR
  - Portable Echocardiogram
  - CT

Medical Decision-Making:
- Convert or not convert any arrhythmia
  - Clinical decision
  - Dependent on stability of the case
- Pace or not to pace
  - Temporary solution
- Alert ED/Cardiac Unit
- Secure transfer to the facility

Arrhythmias

- Arrhythmias can be a single manifestation of multiple psychological and hormonal disorders (physiological response)
  - Sinus tachycardia: In the setting of hyperthyroidism, anxiety attacks and pheochromocytoma
  - Bradycardia: Cushing disease
- There is a strong association between illicit drug use and arrhythmias
  - Example: Cocaine and its relationship with ventricular arrhythmias and sudden death
- One of the highest risks for developing arrhythmias is patients with recent myocardial injury (ACS)
  - Multiple observational and randomized clinical trials addressed this phenomenon of arrhythmias and subsequent sudden-death

Approach to Arrhythmias

Three Essential Questions:
- Heart rate
- QRS width
- P wave

Arrhythmias can present in a wide range of manifestations
- Palpitations
- SOB
- Vertigo
- Syncope

Currently, there are no observational studies evaluating the etiology of arrhythmias in Urgent Care settings.
Approach to Arrhythmias

QRS Rate:
- Fast
- Slow
- Irregular

QRS Width:
- Normal
  - Adults: < 120 ms
  - Pediatrics: age dependent
- Narrow
  - Sinus
  - SVT or Atrial Ectopic
  - Junctional
- Wide
  - Ventricular
  - Aberrancy
    - bundle branch block
    - Accessory Pathway

Approach to Arrhythmias

P waves
- None
  - Hidden in QRS or T
- Single or multiple
- Flutter or fibrillation
- Normal or abnormal axis
- Relationship with QRS

Bradycardia

- Definition: QRS complex count < 60/min
- Sinus Bradycardia is fairly common in athletic young patients. This finding should be considered a normal physiological response
- Bradycardia is the heart conduction system response to β-blocker medications

Mechanisms of Bradycardia

- Sinus Bradycardia
  - Physiological
- Increased parasympathetic tone
  - Athletes, sedation, hypoxemia
- Cushing's Triad
  - Increased ICP
- SA node dysfunction
  - Sick Sinus Syndrome
- Anti-arrhythmic Medications
  - Digitalis
- Associated with junctional or ventricular escape rhythms
Mechanisms of Bradycardia

- First degree: AV nodal dysfunction
  - Prolonged PR interval
  - Narrow QRS
  - All beats conducted
- Second degree: Intermittent failure of AV conduction
  - Mobitz type I
    - Progressive prolongation of PR interval
    - Also known as Wenckebach
    - Better prognosis than Mobitz type II
  - Mobitz type II
    - PR interval remains constant
    - Dropped/unconducted P wave

- Third degree: Absence of AV conduction
  - Dissociation of p-wave & QRS complex (complete block)
  - Serious condition
  - Treat with temporary pacing
  - Transfer to cardiac facility for further management
  - Pacemaker

Sinus Bradycardia

First Degree AV Block

Second Degree AV Block – Mobitz Type I
Second Degree AV Block – Mobitz Type II

Third Degree AV Block – Complete Block

Treatment of Bradycardia

- Epinephrine
- Atropine
- Isoproterenol
- Pacing
  - Temporary leads
  - Transthoracic
  - Transesophageal

Tachycardia

- Definition: QRS complex count > 100/min
- Tachycardia:
  - Increased Automaticity/Ectopic
    - Atrial
    - Junctional
    - Ventricular (AET, JET, VT)
  - Re-entry
    - Accessory pathway: (AVRT)
    - “Dual” AV node physiology (AVNRT)
    - Atrial flutter/fibrillation (IART)

Supraventricular Tachycardia

- Definition: The rhythm that starts (triggers) above the ventricular conduction system.
- SVT is commonly known as AVRT (re-entry mechanism). But it also occurs from increased automaticity in the atrial.
- Adenosine is the “magic” medication which acts to reset the conduction.
- Here is an example:
### Supraventricular Tachycardia

**Case #1**
- Narrow QRS rhythm at 220 bpm, patient appears sedated, no palpable pulses
- Treatment:
  - Adenosine
  - Amiodarone
  - Cardioversion
  - Digoxin
  - Beta blocker
  - Intubation
  - Lidocaine
  - Vagal maneuvers

**Case #2**
- Narrow QRS rhythm at 220 bpm, with low BP
- Treatment:
  - Adenosine
  - Amiodarone
  - Cardioversion
  - Digoxin
  - Beta blocker
  - Intubation
  - Lidocaine
  - Vagal maneuvers

### Treatment for SVT: The First Minute
- Vagal stimulation
- Adenosine (with ECG)
- Repeat adenosine and vagal after other medical Rx. Other – Amiodarone, digoxin, beta blockers, verapamil: slow conduction

### Treatment for SVT: The First Minute

#### AVNRT
- AV nodal re-entrant mechanism
- Common and mostly benign
- Triggered anterograde pulse of retrograded wave through secondary pathway during refractory period
- No ventricular involvement

#### AVRT
- AV re-entrant mechanism
- Rare
- Extra conducting pathway
- Wolf-Parkinson-White syndrome
- The use of AV blockers can stimulate the conduction and cause ventricular activation

### Re-entry Tachycardias

1) Cardioversion
   - Indications: SOB, alter MS, hypotension
   - Synchronized, ½ to 4 J/k
2) Adenosine
   - 0.1-0.3 mg/kg IV push with large flush
3) Vagal maneuvers:
   - Valsalva maneuver
   - Carotid massage (caution in older patients)
   - Orbital pressure and ice on face
Wolf-Parkinson-White Syndrome

Re-entry Tachycardias

- Atrial Fibrillation
  - Disassociation between the atrial electrical activity and its mechanical function
  - P waves are irregular and variable
  - Ventricular response: rapid vs. slow
  - Clinical Classification: acute, chronic, paroxysmal/intermittent
  - Rate control vs. Rhythm control
  - Anticoagulation treatment

- Management
  - Establish ABCDs
  - Focus on prior arrhythmia diagnosis and treatment
  - Any coexisting etiologies
    - ACS, PE, CVA, etc.

Atrial Fibrillation

- RVR with stable BP
  - Management
    - If new onset, transfer for further evaluation.
    - Rate control
      - CCB
      - B-blocker
      - Amiodarone can be used but can cause conversion
    - Echocardiogram
    - Electrolytes (K and Mg)
    - Discharge from the hospital after rate control and anticoagulation as needed

- RVR with unstable BP
  - Management
    - Start ABCDs
    - Prepare for cardioversion
    - Alert the medical facility
    - ± Ventricular stabilizer
      - Amiodarone

Atrial Fibrillation with Ventricle Pacer
Re-entry Tachycardias

• Atrial Flutter
  – Atrial tissue activates a large circuit around the atrium, mostly from R atrium.
  – P rate
    • 240-440 according to Type: I or II
    • Conduction across AV is more common as 2:1 or 4:1 vs. 3:1 or 5:1
  – Goal
    • Control rate as in AF along with anti-coagulation

Atrial Flutter

Increased Automaticity/Ectopic Tachycardias

• Junctional Ectopic Tachycardia (JET)
  – Management
    • Medications: Amiodarone, Digoxin, Procainamide, Propafenone, Flecainide, Sotalol
    • Supportive
    • Pacing

Ventricular Tachycardias

• Rapid, dissociated rhythm with wide QRS complex
• The result of abnormal cardiac tissue with increasing focal automaticity ± re-entry
• Capture beat: sensing the anatomical conduction pulses
• Nonsustained VT < 30 seconds

Ventricular Tachycardia

Ventricular Fibrillation
Treatment for Ventricular Tachycardia

- IV Amiodarone:
  - 5-10 mg/kg bolus by 1-2 mg/kg slow push over 5 minutes, repeat q10-20 minutes
  - 10 mg/kg/day IV infusion x 4-14 days
  - Convert to q6h bolus therapy to minimize leaching of plasticizers from IV tubing
- Lidocaine 1 mg/k bolus
- Cardioversion ½ to 4 J/kg (Pediatrics) or 100-200 J

Cardioversion

- Can be applied in situations of arrhythmias affecting the stability of blood pressure
- Prompt approach will result in better outcome
- Sedation or paralyzing protocol should be applied as the patient can awaken during the procedure
- Observational studies demonstrated cardiac damage when >200J were used

Fatal Rhythm: Compromised Vital Signs

- Any life-threatening arrhythmias should be addressed promptly
- Institute the ABCD protocol steps
- Important to manage arrhythmias and address the reason for arrhythmias/primary diagnosis: ACS, PE, CVA

Cardiac Pacemakers:

- There are an increasing number of patients with pacemaker and ICD devices that requires special knowledge with the physiology of the device management
- Pacemaker abnormalities: Device vs. leads
- Require special attention to medications and electrolytes
Irregular Rhythms

Differential:
- Sinus arrhythmia: sinus pause, sick sinus syndrome, sinus exit block
- Premature atrial contractions, wandering atrial pacemaker
- Atrial fibrillation or flutter with variable conduction
- 2nd degree AV block
- Premature ventricular contraction

Antiarrhythmic Classification

The most common medications used for stabilization of arrhythmias in the urgent care setting according to their antiarrhythmic classifications are:
- Class IA: Procainamide and Quinidine
  — Usually not often used
- Class IB: Lidocaine and Phenytoin
  — Lidocaine in ventricular arrhythmias
- Class IC: Flecainide
  — For conversion of Atrial fibrillation
- Class II: β-Blockers
- Class III: Amiodarone and Sotalol
- Class IV: CCB - nondihydropyridine type
  — Verapamil* do not use in certain conditions

Couple Points from our Practice

- Medications could affect the normal cardiac conduction including medications use in psychiatric, hormonal or pulmonary diseases
- Cardiac monitoring in the Urgent Care setting may reveal an accurate diagnosis while the patient is waiting for further work-up or to be transferred to a higher level of care facility