

Arrhythmias and Dysrhythmias: PBL

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Dr. Barstow is a graduate of the Uniformed Services University of the Health Sciences – F. Edward Herbert School of Medicine in Bethesda, Maryland. He completed undergraduate studies at the U.S. Military Academy. Dr. Barstow joined the Womack Army Medical Center Family Medicine Residency Program in 2012, and created the fellowship program, accepting the first fellow in July 2015. His areas of interest include inpatient family medicine, newborn care, and point-of-care ultrasound teaching.

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Learning Objectives

1. Practice applying new knowledge and competencies gained from Arrhythmias and Dysrhythmias sessions, and receive feedback from expert faculty.
2. Interact collaboratively with peers to solve complex and challenging case-study scenarios.
3. Develop problem-solving skills that promote effective reasoning to manage arrhythmias and dysrhythmias within the context of professional practice.

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Audience Engagement System

Step 1: A mobile app home screen with a 'CMEcenter' logo and a red arrow pointing to a 'CMEcenter' icon.

Step 2: A list of CME activities with a red arrow pointing to a specific activity.

Step 3: A detailed view of a CME activity titled 'CME011 Acute Coronary Syndromes: Unchain My Heart' with a red arrow pointing to the 'Start' button.

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Case

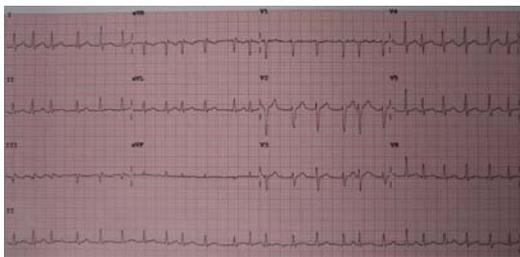
Evelyn is a 73-year old woman who presents to your office complaining of palpitations. The episodes come and go and last about 20 minutes. She tells you she feels short of breath during these episodes.

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Case

You obtain a 12-lead ECG which shows the following:

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What is your diagnosis?

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Atrial Fibrillation

- Most common cardiac arrhythmia worldwide
- Disease of aging
 - 1% patients < 60
 - 8-12% patients > 80
- 450,000 admission per year in the US
- Significant cause of stroke
 - Increased mortality and morbidity from stroke from AF

Go AS, Mozaffarian D, Roger VL, et al. Heart disease and stroke statistics-2014 update: a report from the American Heart Association. Circulation. 2014; 129(5):e28-e292.

Atrial Fibrillation

- Paroxysmal AF
- Persistent AF
- Long-standing AF
- Permanent AF
- Nonvalvular AF

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What are your next steps?
Which decisions do you and Evelyn
have to make?

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Do you go with rhythm control?
Rate control?

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Treatment of Atrial Fibrillation Rate vs. Rhythm Control

- AFFIRM and RACE trials
- Rate control equivalent to rhythm control
- Rhythm control
 - Proarrhythmic
 - Requires monitoring
 - Reoccurs in 20-60% at one year
 - Increased hospitalization rate

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Rate Control

- Beta blockers
 - esmolol
 - propranolol
 - metoprolol
- Nondihydropyridine calcium channel blockers
 - diltiazem
 - verapamil
- Digoxin
- Amiodarone

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Rhythm Control

- Cardioversion
- Antiarrhythmic drugs
- Catheter ablation

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Cardioversion

For episodes <48 hours duration

- Perform cardioversion

For episodes > 48 hours

- Anticoagulation 3 weeks before and 4 weeks after
or
- TEE to rule out LA thrombus, then cardioversion

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Cardioversion

- Electrical
- Pharmacological
 - Flecainide
 - Dofetilide
 - Propafenone
 - Ibutilide
 - Amiodarone

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Antiarrhythmic Drugs

Medications to maintain sinus rhythm

- Dronedarone
- Amiodarone
- Flecainide
- Propafenone

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Should you consider antiplatelet therapy?
What about anticoagulation?

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Anticoagulation

- In patients with AF, antithrombotic therapy should be individualized based on absolute and relative risks of stroke and bleeding (Class I; LOE: C)
- Selection of antithrombotic therapy should be based on the risk of thromboembolism irrespective of whether the AF pattern is paroxysmal, persistent, or permanent (Class 1; LOE C)
- In patients with nonvalvular AF, the CHA₂DS₂-VASc score is recommended for assessment of stroke risk. (Class 1; LOE B)

January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol 2014; 64: e1-76.

CHA₂DS₂-VASc

- Congestive heart failure
- Hypertension
- Age > 75 (2 points)
- Diabetes mellitus
- Prior stroke or TIA or thromboembolism (2 points)
- Vascular disease
- Age 65-74 years
- Sex category (female sex)

January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol 2014; 64: e1-76.

HAS-BLED Score

- Hypertension (Uncontrolled > 160 mm Hg)
- Abnormal liver/renal function
- Stroke
- Bleeding history
- Labile INR (<60% time in therapeutic range)
- Elderly (Age >65)
- Drug/alcohol use

Pister R, et al. A novel user-friendly score (HAS-BLED) to assess 1-year risk of major bleeding in patients with atrial fibrillation. Chest. 2010; 138: 1093-1100.

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Anticoagulation

Warfarin

Novel oral anticoagulants

- dabigatran
- rivaroxaban
- apixaban

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What is the absolute risk reduction for stroke for aspirin?

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Two months later, Evelyn returns to your clinic complaining of palpitations and shortness of breath. Her heart rate is 140 beats per minute at rest. What do you want to do?

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Treatment of Atrial Fibrillation Acute Management

If hemodynamically unstable

- Electrical cardioversion

If hemodynamically stable but symptomatic

(with no pre-excitation)

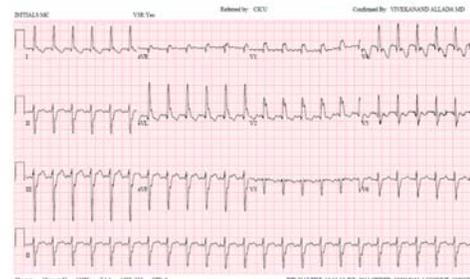
- Metoprolol 2.5-5.0 mg IV bolus every 3 min; up to 3 doses
- Verapamil 0.075-0.15 mg/kg IV bolus over 2 min; may give an additional 10.0 mg after 30 min in no response, then 0.005 mg/kg/min infusion
- Diltiazem 0.25 mg/kg IV bolus over 2 min; then 5-15 mg/hr

January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol* 2014; 64: e1-76.

Case

You admit Evelyn to the hospital and successfully rate control her. During her hospital stay, the following ECG is obtained.

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What is your diagnosis?

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Atrial Flutter

- Reentrant atrial arrhythmia
- Regular atrial rate
- Constant p-wave morphology
- Similar risk factors for atrial fibrillation
- Atrial flutter and atrial fibrillation can coexist in same patient

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Atrial Flutter

Acute Management

1. Hemodynamically unstable
 - Rhythm control
 - Synchronized cardioversion (Class 1)
 - Rate control
 - IV amiodarone (Class 2a)
2. Hemodynamically stable
 - Rhythm control
 - Synchronized cardioversion (Class 1)
 - Rate control
 - IV beta blockers, diltiazem, verapamil (Class 1)
 - IV amiodarone (Class 2a)

Page RL, Joglar JA, Caldwell MA, et al. 2015 ACC/AHA/HRS guideline for the management of adult patients with supraventricular tachycardia: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol. 2016; 67: e27-115.

Atrial Flutter

Chronic Management

1. Rate control
 - Beta blockers, diltiazem, verapamil (Class 1)
2. Rhythm control
 - Catheter ablation (Class 1)
 - Amiodarone, dofetilide or sotalol (Class 2a)
 - Flecainide or propafenone (Class 2b)

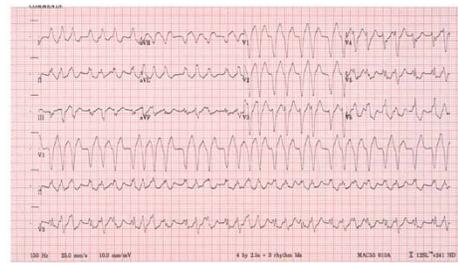
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Case

Three months after discharge, Evelyn is brought has a recurrence of her palpitations and shortness of breath. She goes to the local Emergency Department where a 12-lead ECG is obtained.

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Wide Complex Tachycardia

- Ventricular tachycardia
- Supraventricular rhythm with abnormal conduction

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Wide Complex Tachycardia

SVT with abnormal conduction

- Pre-existing bundle-branch block or intraventricular conduction defect
 - Aberrant conduction due to tachycardia (normal QRS in sinus rhythm)
 - Electrolyte or metabolic disorder
 - Conduction over an accessory pathway
- Paced rhythm

Page RL, Joglar JA, Caldwell MA, et al. 2015 ACC/AHA/HRS guideline for the management of adult patients with supraventricular tachycardia: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol. 2016; 67: e27-115.

Management of Wide Complex Tachycardia

- If patient is unstable
- Synchronized cardioversion
- If regular and monomorphic
- Consider adenosine
 - Antiarrhythmic therapy
 - Procainamide
 - Amiodarone
 - Sotalol
 - Cardioversion
- If irregular
- Treat as atrial fibrillation or flutter
- If polymorphic
- Defibrillation

American Heart Association. Part 7: Advanced Cardiovascular Life Support. Web-based integrate 2010 and 2015 Guidelines. <https://www.guidelines.heart.org/wp-content/themes/accstaging/docs/pdf/master/pdf/07a-7-adv-advanced-cardiovascular-life-support.pdf>. Accessed July 2016.

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Question

Which of the following medications are contraindicated in patients with atrial fibrillation with pre-excitation?

- A. Digoxin
- B. IV amiodarone
- C. Beta blockers
- D. Diltiazem
- E. Verapamil
- F. All of the above

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What we're doing doesn't seem to be working. Should we refer her for ablation?

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Catheter Ablation

- Symptomatic paroxysmal AF refractory to medication when rhythm control is desired (Class 1: LOE A)
- Recurrent symptomatic paroxysmal AF in some patients (Class 2a: LOE A)
- Reasonable for persistent AF refractory to medication (Class 2a: LOE A)

January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol 2014; 64: e1-76.

Case

In the Emergency Department, Evelyn is electrically cardioverted. After observation overnight, she is discharged. One week later her husband calls EMS after she has a syncopal episode at home.

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What is the differential diagnosis for syncope?
What should you consider in Evelyn's case?

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Causes of bradycardia

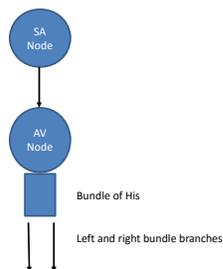
- Sinus node dysfunction (sick sinus syndrome)
- Atrioventricular block
- Reflex syncope
- Toxins
- Systemic disease
- Electrolytes
- Conduction disturbance
- Medications

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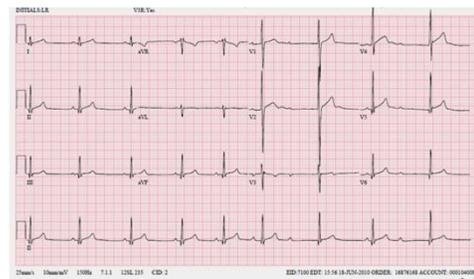
Atrioventricular Blocks

- Delayed conduction through AV conduction system
- First degree
- Second degree type 1 (Wenkebach)
- Second degree type 2
- Third degree

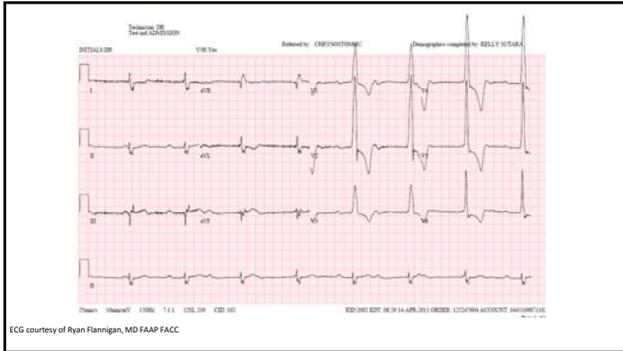
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ECG courtesy of Ryan Flannigan, MD FAAP FACC.



Case

The initial evaluation in the ED is negative and Evelyn is once again admitted to the hospital for observation. Overnight, telemetry shows an episode of atrial fibrillation followed by a 6-second sinus pause, followed by sinus bradycardia at a rate of 35 beats per minutes. During this time, Evelyn reports feeling weak and near-syncope.

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What is your diagnosis?

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Sinus Node Dysfunction

- Problem with the sinus node and surrounding tissue
- Disease of the elderly
- Sinus bradycardia or tachy-brady
- Indications for pacemaker placement
 - Symptomatic bradycardia
 - Chronotropic incompetence
 - Symptomatic bradycardia from required drug therapy

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What do you do?

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Treatment Sinus Node Dysfunction

- Permanent pacemaker placement

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Treatment Bradycardia

- Atropine
- Reversible causes
- Transcutaneous pacing
- Dopamine
- Epinephrine
- Isoproterenol
- Transvenous pacing

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Causes

Acute bradycardia (sinus bradycardia and AV blocks)

1. Ischemia or infarction
2. Conduction disease
3. Medication effects
 - Beta blockers
 - Calcium channel blockers
 - Tricyclic antidepressants

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Case

Pacer pads are placed and Evelyn is transferred to a tertiary care center. She is evaluated by an electrophysiologist and a permanent pacemaker is placed

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Questions?

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Contact Information

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Associated Session

- Arrhythmias and Dysrhythmias

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