Lake EMS Basic EKG Review: Atrial Rhythms

The Lake EMS Quality Development Team
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Use of this program is limited to training and Quality Education only

Captain Mike Hilliard, Lake EMS Training Officer
2761 West Old Highway 441, Mount Dora, FL 32757-3500
352/383-4554 (w); 352/735-4475 (f); mhilliard@lakeems.org
The challenge

- With respect to the many revered instructors and authors who teach electrocardiology rhythm assessment, there are many differences in opinion regarding things such as heart rates for rhythms.
  - So we defined our own parameters with the blessings of the Lake County Medical Director, Pushpal R. Banerjee, D.O.
Our solution

- Consequently, our Basic EKG Online review meets the criteria as set forth by our Quality Development Department:
  - John Simpson, Chief Operations Officer
  - Michael R. (Mike) Hilliard, Non-Clinical/Non-Quality Training Officer
  - Jamie A. Lowery, District Chief, Field Training Coordinator
  - Scott Temple, Clinical Training Officer
  - Julie Treadwell, Clinical Quality Officer

- And our Medical Director:
  - Pushpal R. (Paul) Banerjee, D.O.
Basic stuff

- When electricity stimulates muscle we witness depolarization
  - This is an electrical phenomenon
  - We hope mechanically that the muscle contracts

- When a muscle relaxes we see repolarization on the monitor
  - If the muscle mass is large enough
Normal Impulse Conduction

SA Node
The heart generates its own electricity, termed Automaticity

This refers to the heart being its own pacemaker
Normal Impulse Conduction

SA Node
Sinoatrial (SA) Node starts 99% of all rhythms; unfortunately, we in EMS often see the remainder during our work schedule.
Normal Impulse Conduction

SA Node

Normal heart pacemaker; automaticity is the term used to create an impulse
Normal Impulse Conduction

SA Node

*It fires an electrical impulse*
Normal Impulse Conduction

Intra-atrial pathways

- Sinus Node
- AV Node
- Bundle Of His
- Right Bundle Branch
- Left Bundle Branch
- Purkinje fibers
Normal Impulse Conduction

Intra-atrial pathways
Carries impulse throughout both atria
Normal Impulse Conduction

Intra-atrial pathways
Allows depolarization of atria
Normal Impulse Conduction

AV Node

Sinus Node

AV Node

Bundle Of His

Right Bundle Branch

Left Bundle Branch

Purkinje fibers
Normal Impulse Conduction

AV Node
Atrioventricular (AV) Node delays (holds) electrical impulse
Normal Impulse Conduction

AV Node
Allows ventricles (two bottom chambers of the heart) to fill with blood from atria (two top chambers of the heart)
Normal Impulse Conduction

AV Junction

- Sinus Node
- AV Node
- Bundle Of His
- Right Bundle Branch
- Left Bundle Branch
- Purkinje fibers
Normal Impulse Conduction

**AV Junction**

*Directly below the AV Node is the AV Junction; primarily is just a name of the pathway into the ventricles*
Normal Impulse Conduction

Bundle of His

Sinus Node
AV Node
Right Bundle Branch
Left Bundle Branch
Purkinje fibers
Normal Impulse Conduction

Bundle of His
Carries impulse to bundle branches; primarily is just a name of the pathway into the septum
Normal Impulse Conduction

Bundle of His
Carries impulse to bundle branches; primarily is just a name of the pathway into the septum

Septum is divider of the two bottom chambers, termed the ventricles
Normal Impulse Conduction

Bundle Branches

- Sinus Node
- AV Node
- Bundle of His
- Right Bundle Branch
- Left Bundle Branch
- Purkinje fibers
Normal Impulse Conduction

Bundle Branches

*Right branch transmits impulse to right ventricle; left branch transmits impulse to left ventricle, it further breaks into an anterior and posterior hemi-branch.*
Normal Impulse Conduction

Bundle Branches
So yes, the heart does have a hemi...
Normal Impulse Conduction

Purkinje fibers

- Sinus Node
- AV Node
- Bundle Of His
- Left Bundle Branch
- Right Bundle Branch
- Purkinje fibers
Normal Impulse Conduction

Purkinje fibers

*Impulse is now transmitted to ventricular muscle allowing depolarization*
Impulse Conduction & the EKG

How does this form an EKG on the monitor?

Let's break it down one step at a time.
Impulse Conduction & the EKG

Sinoatrial node
Impulse Conduction & the EKG

Sinoatrial node

↓

AV node

PR

R

P

Q

S

T
Impulse Conduction & the EKG

- Sinoatrial node
- AV node
- Bundle of His
- Bundle Branches
- Purkinje fibers

![Diagram of heart conduction system]
The “PQRST”

- P wave – Atrial depolarization
The “PQRST”

- **P wave** – Atrial depolarization
The PR Interval

Atrial depolarization
+
 delay in AV node

- Delay allows time for the atria to contract before the ventricles contract
The PR Interval

Atrial depolarization

+ delay in AV node

- Delay allows time for the atria to contract before the ventricles contract
The “PQRST”

- QRS – Ventricular depolarization
The “PQRST”

- QRS – Ventricular depolarization
The “PQRST”

- T wave – Ventricular repolarization
The “PQRST”

- T wave – Ventricular repolarization
Automaticity and Inherent Myocardial Cell Firings

- So, let us start by remembering the average rates of initiated heart rates:
  - SA Node: 60-150 bpm (beats-per-minute)
  - AV Junction: 40-60 bpm
  - Ventricles: 30-40 bpm
- These are normal values, other rates can and do occur at times
“Hey, that looks like…”

- Many of us were taught how to visually recognize EKGs
- We were taught a simple process of 5-steps that help define the rhythm characteristics; however, over time we returned to the visual recognition
Basic wave breakdown

- Please understand this is an interpretation review, not a diagnostic patient assessment.
- Always treat the patient and not the monitor.
  - P-wave: Atrial depolarization
  - QRS-complex: Ventricular depolarization
  - T-wave: Ventricular repolarization
1st Axiom of EMS

- And if you forget to treat the patient and are considering treating the monitor, remember the first axiom of EMS:
1st Axiom of EMS

And if you forget to treat the patient and are considering treating the monitor, remember the first axiom of EMS:

- If you’re not sure what to do, ask your EMT what the other paramedics would do in a similar situation
5-Part EKG Assessment
Your key to success

1. **Rate**:
   - QRS in 6-second strip, multiply x 10

2. **Rhythm**:
   - QRS distances consistent throughout strip

3. **P-waves** *(in the entire strip being assessed)*:
   - Are P-waves present?
   - Do they look like a small rounded hill?
   - Is there a P for every QRS?
   - Is there a QRS for every P?
   - Does each P look like all the others?
   - Is each P the same distance from the QRS?

4. **P to R Interval (PRI)**:
   - 0.12 to 0.20 seconds

5. **QRS-Complexes**:
   - Narrow: <0.12-seconds (3 small boxes)
   - Wide: ≥0.12-seconds
Part 1: Rate

Rate:
- Count the QRSs present in a 6-second strip, then multiply that total x 10
- Now you have the heart rate

The EKG paper is formatted so that 1-inch equals 1-second in time
- 6-inches equates to 6-seconds
Sample counting
Sample counting:
Identify 6-second strip

Start here
Sample counting:
Identify 6-second strip
Sample counting:
Identify 6-second strip
Sample counting:
Identify 6-second strip
Sample counting:
Identify 6-second strip
Sample counting:
Identify 6-second strip
Sample counting: Identify 6-second strip
Sample counting: Identify 6-second strip

End here
Sample counting:
Identify 6-second strip

Hence, a six (6) second strip
Sample counting: Identify QRS-complexes in 6-second strip
Sample counting: Identify QRS-complexes in 6-second strip
Sample counting: Identify QRS-complexes in 6-second strip
Sample counting: Identify QRS-complexes in 6-second strip
Sample counting: Identify QRS-complexes in 6-second strip
Sample counting: Identify QRS-complexes in 6-second strip
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Sample counting: Identify QRS-complexes in 6-second strip
Sample counting: Identify QRS-complexes in 6-second strip

- $8 \times 10 = 80$-bpm (beats per minute)
Part 2: Rhythm

- Rhythm:
  - Are QRS distances consistent throughout strip
    - Is distance from each QRS to other the same?

- If consistent, rhythm is regular
- If inconsistent, rhythm is irregular
Sample rhythm assessment: Identify if QRSs are regular in 6-second strip
Sample rhythm assessment: Identify if QRSs are regular in 6-second strip
Sample rhythm assessment: Identify if QRSs are regular in 6-second strip

Are these equal to each other (hint, say yes)
Sample rhythm assessment: Identify if QRSs are regular in 6-second strip

Are these equal to each other (hint, say yes)
Sample rhythm assessment: Identify if QRSs are regular in 6-second strip

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Sample rhythm assessment: Identify if QRSs are regular in 6-second strip.

Are these equal to each other (hint, say yes).
Sample rhythm assessment: Identify if QRSs are regular in 6-second strip

Are these equal to each other (hint, say yes)
Sample rhythm assessment: Identify if QRSs are regular in 6-second strip

Are these equal to each other (hint, say yes)
Sample rhythm assessment: Identify if QRSs are regular in 6-second strip

- Then this rhythm is regular
Part 3: P-waves

- P-waves (in the entire strip being assessed):
  - Are P-waves present?
  - Do they look like a small rounded hill?
  - Is there a P for every QRS?
  - Is there a QRS for every P?
  - Does each P look like all the others?
  - Is each P the same distance from the QRS?
Sample P-wave assessment: Identify in 6-second strip

- Are P-waves present?
Sample P-wave assessment: Identify in 6-second strip

- Are P-waves present?

- YES!
Sample P-wave assessment: Identify in 6-second strip

- Do they look like a small rounded hill?
Sample P-wave assessment:
Identify in 6-second strip

- Do they look like a small rounded hill?
- YES!
Sample P-wave assessment: Identify in 6-second strip

- Is there a P for every QRS?
Sample P-wave assessment: Identify in 6-second strip

☐ Is there a P for every QRS?

☐ YES!
Sample P-wave assessment: Identify in 6-second strip

- Is there a QRS for every P?
Sample P-wave assessment: Identify in 6-second strip

☐ Is there a QRS for every P?

☐ YES!
Sample P-wave assessment: Identify in 6-second strip

- Does each P look like all the others?
Sample P-wave assessment: Identify in 6-second strip

- Does each P looks like all the others?
- YES!
Sample P-wave assessment: Identify in 6-second strip

- Is each P the same distance from the QRS?
Sample P-wave assessment: Identify in 6-second strip

- Is each P the same distance from the QRS?
  - YES!
Part 4: PRI
(not Public Radio International)

- P to R Interval (PRI):
  - 0.12 to 0.20 seconds
  - (3-5 small boxes)

- The PRI is a window into the effectiveness of the AV Node
  - AV Node has the duty to delay the atrial impulse to allow for better ventricular filling
Sample PRI assessment: Identify in 6-second strip
Sample PRI assessment:
Identify in 6-second strip
Sample PRI assessment:
Identify in 6-second strip

5-small boxes = 0.20 seconds
Part 5: QRSs

- QRS-Complexes:
  - Narrow: <0.12-seconds (3 small boxes or less)
  - Wide: >0.12-seconds
Sample QRS width assessment: Identify in 6-second strip

Start measuring when it leaves the flat baseline
Sample QRS width assessment: Identify in 6-second strip
Sample QRS width assessment:
Identify in 6-second strip
Sample QRS width assessment: Identify in 6-second strip

Stop measuring when it returns to a baseline
(may be higher than where you started but it will either level off or go into T-wave)
Sample QRS width assessment: Identify in 6-second strip
Sample QRS width assessment: Identify in 6-second strip
Sample QRS width assessment:
Identify in 6-second strip

2-small boxes = 0.08 seconds
QRS Width

- 85% of time, if QRS is narrow, impulse starts in atrium
- 85% of time, if QRS is wide, impulse starts in ventricle
5-Part EKG Assessment

1. **Rate:**
   - QRS in 6-second strip, multiply x 10

2. **Rhythm:**
   - QRS distances consistent throughout strip

3. **P-waves** *(in the entire strip being assessed)*:
   - Are P-waves present?
   - Do they look like a small rounded hill?
   - Is there a P for every QRS?
   - Is there a QRS for every P?
   - Does each P looks like all the others?
   - Is each P the same distance from the QRS?

4. **P to R Interval (PRI):**
   - 0.12 to 0.20 seconds

5. **QRS-Complexes**:
   - Narrow: <0.12-seconds (3 small boxes)
   - Wide: ≥0.12-seconds
Normal Sinus Rhythm

- NSR is the normal rhythm produced when the SA node initiates the cardiac electrical impulse.
- It is what we compare most rhythms against.
Normal Sinus Rhythm

1. Rate: 60 – 99, on average
2. Rhythm: Regular
3. P-waves: Normal
4. PRI: Normal
5. QRS: Narrow
Normal Sinus Rhythm
5-Part EKG Assessment

1. Rate:
   ■ What is the rate?
5-Part EKG Assessment

1. Rate:
   - 80-bpm
5-Part EKG Assessment

2. Rhythm:
   - Is the rhythm regular or irregular?
5-Part EKG Assessment

2. Rhythm:
   ■ Regular
5-Part EKG Assessment

3. P-waves:
  - Are P-waves present?
  - Do they look like a small rounded hill?
  - Is there a P for every QRS?

  - Is there a QRS for every P?
  - Does each P looks like all the others?
  - Is each P the same distance from the QRS?
5-Part EKG Assessment

3. P-waves:
   - P-waves? Yes
   - Look like rounded hill? Yes
   - P for every QRS? Yes

   - QRS for every P? Yes
   - P looks like each other? Yes
   - P same distance from the QRS? Yes
5-Part EKG Assessment

4. P to R Interval (PRI):
   ▪ Is the PRI between 3-5 small boxes?
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Yes, 0.20-seconds
5-Part EKG Assessment

5. QRS-Complexes:
   ■ Is QRS narrow or wide?
5-Part EKG Assessment

5. QRS-Complexes:

- Narrow, 0.08-seconds
This is Normal Sinus Rhythm

1. Rate: □ 80
2. Rhythm: □ Regular
3. P-waves: □ Normal
4. PRI: □ Normal
5. QRS: □ Narrow
And now...

- For something completely different
Sinus Arrhythmia

- A slight irregularity in sinus rhythm
Sinus Arrhythmia

1. Rate: 60-99, on average*
2. Rhythm: Irregular
3. P-waves: Normal
4. PRI: Normal
5. QRS: Narrow

*By “on average” we mean over a minute the rate would be between 60-99
Sinus Arrhythmia
5-Part EKG Assessment

1. Rate:
   - What is the rate?
5-Part EKG Assessment

1. Rate:
   - 60-bpm
5-Part EKG Assessment

2. Rhythm:
   - Is the rhythm regular or irregular?
2. Rhythm:

- Irregular
5-Part EKG Assessment

3. P-waves:
   - Are P-waves present?
   - Do they look like a small rounded hill?
   - Is there a P for every QRS?
   - Is there a QRS for every P?
   - Does each P look like all the others?
   - Is each P the same distance from the QRS?
5-Part EKG Assessment

3. P-waves:
   - P-waves? **Yes**
   - Look like rounded hill? **Yes**
   - P for every QRS? **Yes**

QRS for every P? **Yes**
- P looks like each other? **Yes**
- P same distance from the QRS? **Yes**
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Is the PRI between 3-5 small boxes?
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Yes, 0.16-seconds
5-Part EKG Assessment

5. QRS-Complexes:
   - Is QRS narrow or wide?
5. QRS-Complexes:
   ■ Narrow, 0.08-seconds
This is Sinus Arrhythmia

1. Rate:  □ 60
2. Rhythm:  □ Irregular
3. P-waves:  □ Normal
4. PRI:  □ Normal
5. QRS:  □ Narrow
Sinus Bradycardia

- Characterized by a decrease in the rate of atrial depolarization due to slowing of the sinus node
## Sinus Bradycardia

1. **Rate:**
   - Sinus rhythm < 60 bpm

2. **Rhythm:**
   - Regular

3. **P-waves:**
   - Normal

4. **PRI:**
   - Normal

5. **QRS:**
   - Narrow
Sinus Bradycardia
5-Part EKG Assessment

1. Rate:
   - What is the rate?
5-Part EKG Assessment

- Take your time
5-Part EKG Assessment

- You can do it
5-Part EKG Assessment

1. Rate:
   - 40-bpm
2. Rhythm:
   ■ Is the rhythm regular or irregular?
5-Part EKG Assessment

2. Rhythm:
   - Regular
5-Part EKG Assessment

3. P-waves:
   - Are P-waves present?
   - Do they look like a small rounded hill?
   - Is there a P for every QRS?

   - Is there a QRS for every P?
   - Does each P look like all the others?
   - Is each P the same distance from the QRS?
5-Part EKG Assessment

3. P-waves:
   - P-waves? Yes
   - Look like rounded hill? Yes
   - P for every QRS? Yes
   - QRS for every P? Yes
   - P looks like each other? Yes
   - P same distance from the QRS? Yes
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Is the PRI between 3-5 small boxes?
5-Part EKG Assessment

4. P to R Interval (PRI):

- Yes, 0.20-seconds
5. QRS-Complexes:
   - Is QRS narrow or wide?
5-Part EKG Assessment

5. QRS-Complexes:
   - Narrow, 0.06-seconds
This is Sinus Bradycardia

1. Rate: ☐ 40
2. Rhythm: ☐ Regular
3. P-waves: ☐ Normal
4. PRI: ☐ Normal
5. QRS: ☐ Narrow
Sinus Tachycardia

- Sinus tachycardia is characterized by an increase in the rate of discharge of the sinus node
  - Can get to rates as high as 190 bpm
Sinus Tachycardia

1. Rate:          □ Sinus rhythm, 100-150 bpm
2. Rhythm:        □ Regular
3. P-waves:       □ Normal
4. PRI:           □ Normal
5. QRS:           □ Narrow
Sinus Tachycardia
5-Part EKG Assessment

1. Rate:
   - What is the rate?
5-Part EKG Assessment

1. Rate:
   - 120-bpm
2. Rhythm:
   - Is the rhythm regular or irregular?
5-Part EKG Assessment

2. Rhythm:
   - Regular
5-Part EKG Assessment

3. P-waves:
- Are P-waves present?
- Do they look like a small rounded hill?
- Is there a P for every QRS?

- Is there a QRS for every P?
- Does each P looks like all the others?
- Is each P the same distance from the QRS?
5-Part EKG Assessment

3. P-waves:

- P-waves? **Yes**
- Look like rounded hill? **Yes**
- P for every QRS? **Yes**

- QRS for every P? **Yes**
- P looks like each other? **Yes**
- P same distance from the QRS? **Yes**
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Is the PRI between 3-5 small boxes?
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Yes, 0.16-seconds
5-Part EKG Assessment

5. QRS-Complexes:
   - Is QRS narrow or wide?
5-Part EKG Assessment

5. QRS-Complexes:

- Narrow, 0.06-seconds
This is Sinus Tachycardia

1. Rate: □ 120
2. Rhythm: □ Regular
3. P-waves: □ Normal
4. PRI: □ Normal
5. QRS: □ Narrow
Supraventricular Tachycardia

- Paroxysmal Supraventricular Tachycardia (PSVT)
- Supraventricular Tachycardia (SVT)
- Just a category, many rhythms can be in here as long as rate is over 150-bpm and QRS-complex is narrow
- SVT is fast and narrow!
Supraventricular Tachycardia

1. Rate: □ Atrial rhythm > 150 bpm
2. Rhythm: □ Regular
3. P-waves: □ May be obscured in T wave
4. PRI: □ Normal
5. QRS: □ Narrow
Supraventricular Tachycardia
5-Part EKG Assessment

1. Rate:
   - What is the rate?
5-Part EKG Assessment

1. Rate:
   - 270-bpm
5-Part EKG Assessment

2. Rhythm:
   - Is the rhythm regular or irregular?
5-Part EKG Assessment

2. Rhythm:
   ■ Regular
3. P-waves:
- Are P-waves present?
- Do they look like a small rounded hill?
- Is there a P for every QRS?
- Is there a QRS for every P?
- Does each P looks like all the others?
- Is each P the same distance from the QRS?
5-Part EKG Assessment

3. P-waves:

- P-waves? Yes
- Look like rounded hill? Hard to tell, blurred into T-wave
- P for every QRS? Yes
- QRS for every P? Yes
- P looks like each other? Yes
- P same distance from the QRS? Yes
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Is the PRI between 3-5 small boxes?
5-Part EKG Assessment

4. P to R Interval (PRI):

■ Yes, 0.08-seconds
5-Part EKG Assessment

5. QRS-Complexes:
   - Is QRS narrow or wide?
5-Part EKG Assessment

5. QRS-Complexes:
   - Narrow, 0.05-seconds
This is SVT

1. Rate: ☐ 270
2. Rhythm: ☐ Regular
3. P-waves: ☐ Normal
4. PRI: ☐ Normal
5. QRS: ☐ Narrow
ST/SVT: What Came First?

- **ST secondary to:**
  - Medications (illicit, prescribed, or OTC drugs)
  - Fever
  - Fear
  - Anxiety
  - Hypovolemia
  - Pain
  - Other(s)

- **SVT secondary to:**
  - Abrupt
  - Paroxysmal
Atrial Flutter

- This arrhythmia is the result of a reentry circuit within the atria.
- It is often described as resembling a saw tooth or picket fence.
- Atrial waves are called flutter waves (F-waves).
Atrial Flutter

1. Rate:  40-150, on average
2. Rhythm:  May be regular or irregular
3. F-waves:  Resemble a saw tooth
4. PRI:  Normal
5. QRS:  Narrow
Atrial Flutter
5-Part EKG Assessment

1. Rate:
   - What is the rate?
5-Part EKG Assessment

1. Rate:
   - 70-bpm
Just curious, how fast are the atriums firing?
Wicked fast

- Rate:
  - 290-bpm
- The atria do not rest even when the ventricles contract
Wicked fast

- Rate:
  - **290-bpm**
- The atria do not even rest when the ventricles contract
Wicked fast

- Rate:
  - 290-bpm
- The atria do not even rest when the ventricles contract
Wicked fast

- Rate:
  - 290-bpm
- The atria do not even rest when the ventricles contract
Wicked fast

- Rate:
  - 290-bpm

- The atria do not even rest when the ventricles contract
Wicked fast

- Rate:
  - 290-bpm
- The atria do not even rest when the ventricles contract
Wicked fast

- Rate: 290-bpm
- The atria do not even rest when the ventricles contract
5-Part EKG Assessment

2. Rhythm:
   - Is the rhythm regular or irregular?
5-Part EKG Assessment

2. Rhythm:
   - Regular
5-Part EKG Assessment

3. P-waves:
   - P-waves?
   - Look like rounded hill?
   - P for every QRS?
   - QRS for every P?
   - P looks like each other?
   - P same distance from the QRS?
5-Part EKG Assessment

3. P-waves:
   - P-waves? NO
Flutter (F)-waves:

- Do not start in SA Node; impulse starts somewhere else within atria
- Subsequently it does not follow regular pathways and makes a unique wave

- More pointed, like a ski jump, saw tooth, or picket fence appearance
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Is the PRI between 3-5 small boxes?
5-Part EKG Assessment

4. P to R Interval (PRI):

- Yes, 0.20-seconds

  Ok, you might say there is no P-wave, but don’t worry. It’s not significant compared to the appearance of the F-wave
The PRI is a window into the effectiveness of the AV Node
  - AV Node has the duty to delay the atrial impulse to allow for better ventricular filling

In the case of Atrial Flutter, the AV Node still holds the impulse
5. QRS-Complexes:
   - Is QRS narrow or wide?
5-Part EKG Assessment

5. QRS-Complexes:

- Narrow, 0.08-seconds
This is Atrial Flutter

1. Rate: □ 70
2. Rhythm: □ Regular
3. P-waves: □ No, F-waves
4. PRI: □ Normal
5. QRS: □ Narrow
Atrial Fibrillation (A-Fib)

- Atrial fibrillation may result from multiple areas of reentry within the atria or from multiple ectopic foci.
- The atrial electrical activity is very rapid, but each electrical impulse results in the depolarization of only a small islet of atrial myocardium rather than the whole atrium.
Atrial Fibrillation (A-Fib)

- Irregularly irregular:
  - Implies that there is no repeating pattern, ever!
- If you looked at an entire minute of A-Fib, the pattern would never repeat
Time is length

- How long is 60-seconds?
How long is 60-seconds?

- 60-inches
- 5-feet
Atrial Fibrillation (A-Fib)

1. Rate: 40 to 180 beats per minute
2. Rhythm: Irregularly irregular
3. P-waves: No P-waves
4. PRI: None
5. QRS: Narrow
Atrial Fibrillation (A-Fib)
5-Part EKG Assessment

1. Rate:
   - What is the rate?
5-Part EKG Assessment

1. Rate:
   ■ 90-bpm
5-Part EKG Assessment

2. Rhythm:
   - Is the rhythm regular or irregular?
5-Part EKG Assessment

2. Rhythm:

- Irregular

[Diagram showing an irregular rhythm with different waves and annotations]
5-Part EKG Assessment

3. P-waves:
   - Are P-waves present?
   - Do they look like a small rounded hill?
   - Is there a P for every QRS?
   - Is there a QRS for every P?
   - Does each P look like all the others?
   - Is each P the same distance from the QRS?
3. P-waves:
   - P-waves? **No**
5-Part EKG Assessment

3. P-waves:
   - Could you argue that some waves look like P-waves?
3. **P-waves:**
   - Could you argue that some waves look like P-waves?
   - You could; however, **they do not** look like other waves that are preceding the QRS-complex
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Is the PRI between 3-5 small boxes?
5-Part EKG Assessment

4. P to R Interval (PRI):

- No; no P-waves, no PRI
5-Part EKG Assessment

5. QRS-Complexes:
   - Is QRS narrow or wide?
5-Part EKG Assessment

5. QRS-Complexes:

- Narrow, 0.06-seconds
This is Atrial Fibrillation

1. Rate:  □ 90
2. Rhythm: □ Irregular
3. P-waves:  □ None
4. PRI:  □ None
5. QRS:  □ Narrow
Junctional Rhythm

- If the AV node is not depolarized by the arrival of a sinus impulse within approximately 1.0 to 1.5 seconds, AV Junction will initiate an impulse.

- It occurs because of failure of the sinus node to initiate an appropriately timed impulse or because of a conduction problem between the sinus node and the AV junction.
Junctional Rhythm

- Normally a rate of 40 to 60 bpm, can be > 100 bpm
- P waves may precede, coincide with, or follow the QRS
  - If P waves seen, they will be negative (upside down)
Junctional Rhythm

1. Rate: 40-60 bpm, can be > 100
2. Rhythm: Usually regular
3. P-waves: Upside down, if seen
4. PRI: Shortened
5. QRS: Narrow
Junctional Rhythm, before
Junctional Rhythm, during
Junctional Rhythm, and after
The good, bad, and the ugly

Which Junctional rhythm produces the poorest cardiac output? Which one is the besterer?

- Junctional Rhythm, P-wave before QRS
- Junctional Rhythm, P-wave during QRS
- Junctional Rhythm, P-wave after QRS
<table>
<thead>
<tr>
<th></th>
<th>Good</th>
<th>A. Junctional Rhythm, before</th>
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<tbody>
<tr>
<td>1</td>
<td>Bad</td>
<td>B. Junctional Rhythm, during</td>
</tr>
<tr>
<td>2</td>
<td>Ugly</td>
<td>C. Junctional Rhythm, after</td>
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<tr>
<td>3</td>
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</tbody>
</table>

Which is which?
Good:
Junctional Rhythm, after

- Although it may go against common sense, this is the best
  - Because of the extended time for ventricular filling
Bad: Junctional Rhythm, before

- Poor cardiac output as AV node is bypassed resulting in very little ventricular filling time
Ugly: Junctional Rhythm, and during

- Worst cardiac output
  - Identical to a compression in CPR as both chambers compressed at same time
5-Part EKG Assessment

1. Rate:
   - What is the rate?
5-Part EKG Assessment

1. Rate:
   - 50-bpm
Automaticity and Inherent Myocardial Cell Firings

- Remember the initiated heart rate from the AV Junction is a back-up system; it is here to keep us alive:
  - SA Node: 60-150 bpm (Not working)
  - AV Junction: 40-60 bpm
  - Ventricles: 30-40 bpm
    - These are normal values, other rates can and do occur at times
5-Part EKG Assessment

2. Rhythm:
   - Is the rhythm regular or irregular?
2. Rhythm:
   - Regular
5-Part EKG Assessment

3. P-waves:
- Are P-waves present?
- Do they look like a small rounded hill?
- Is there a P for every QRS?
- Is there a QRS for every P?
- Does each P looks like all the others?
- Is each P the same distance from the QRS?
5-Part EKG Assessment

3. P-waves:

- Look like rounded hill? Uh, NO
- Looks like a “U”
No, not ewe too
4. P to R Interval (PRI):
   - Is the PRI between 3-5 small boxes?
5-Part EKG Assessment

4. P to R Interval (PRI):
   - Yes, 0.12-seconds
   - But a little shortened
5-Part EKG Assessment

5. QRS-Complexes:
   - Is QRS narrow or wide?
5-Part EKG Assessment

5. QRS-Complexes:
   - Narrow, 0.06-seconds
This is Junctional Rhythm

1. Rate:  □ 50
2. Rhythm: □ Regular
3. P-waves: □ Inverted
4. PRI: □ Slightly narrow
5. QRS: □ Narrow
This is the end

- Stay tuned for the next installment of Basic EKG Review:
  - Coming up later:
    - Dreaded Heart Blocks
    - Ventricular Rhythms
This program is the Intellectual Property of Lake Emergency Medical Services

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Captain Mike Hilliard, Lake EMS Training Officer
2761 West Old Highway 441, Mount Dora, FL 32757-3500
352/383-4554 (w); 352/735-4475 (f); mhilliard@lakeems.org
Lake EMS Basic EKG Review: Atrial Rhythms

The Lake EMS Quality Development Team