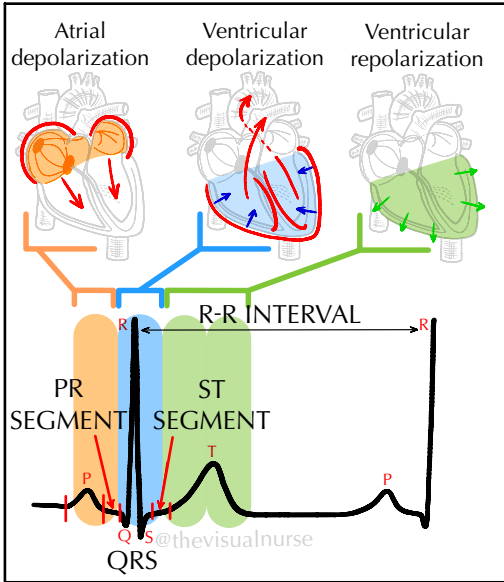
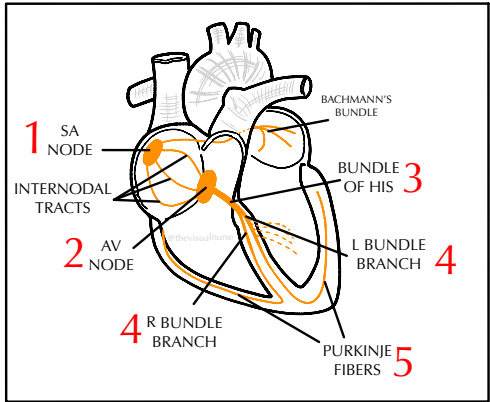


# HOW TO READ AN ECG *Single lead telemetry*

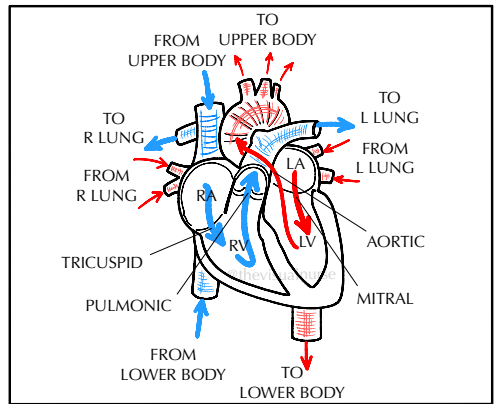
## CARDIAC CYCLE



## CARDIAC CONDUCTION SYSTEM



## BLOOD FLOW THROUGH THE HEART



## MEMORIZING CARDIAC CYCLE NORMAL VALUES

$$\frac{0.12 \text{ to } 0.20 \text{ (PRI)} + <0.12 \text{ (QRS)}}{<0.44 \text{ (QTI)}}$$

## NORMAL SINUS RHYTHM

- One upright P wave per QRS
- All P waves similar in appearance
- PR interval between 0.12-0.20 seconds
- Rate between 60-100 BPM



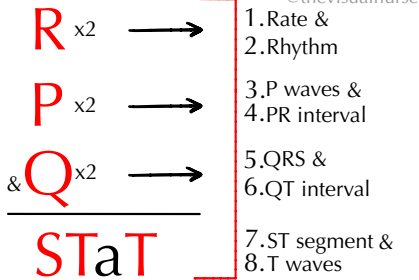
## 8 STEPS TO RHYTHM ANALYSIS

- @thevisualnurse
- R x2 → 1. Rate & 2. Rhythm
  - P x2 → 3. P waves & 4. PR interval
  - & Q x2 → 5. QRS & 6. QT interval
- STaT** → 7. ST segment & 8. T waves

*From a basic nursing and rhythms perspective. Exceptions may exist in the real world.*

# HOW TO READ AN ECG *Single lead telemetry*

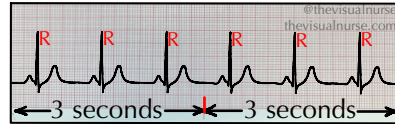
## 8 STEPS TO RHYTHM ANALYSIS



## 1. HEART RATE

What's the heart rate expressed in beats per minute (BPM)?

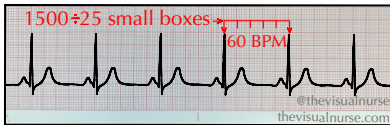
### 6 second method



Count # of R waves present on 6 sec strip & multiply by 10 = HR in BPM

## 1. HEART RATE

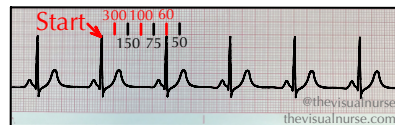
### Small box method



- Count # of small (0.04 sec) boxes between R waves & divide into 1500 = HR in BPM
- Better for regular than irregular rhythms

## 1. HEART RATE

### Big box method

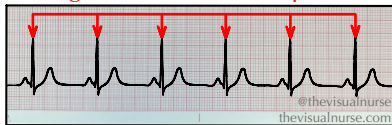


- Find an R wave on a solid big box line
- Count off 300,150,100,75,60,50 on each big box line that follows
- Where next R wave lands = HR in BPM

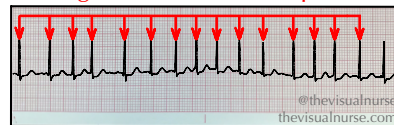
## 2. RHYTHM REGULARITY

Is the rhythm regular or irregular? Ask yourself, "Do the P waves and QRS complexes march out routinely?" This can be done for atrial *and* ventricular response pattern.

### Regular ventricular response



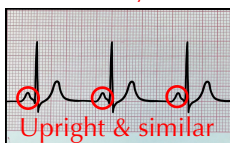
### Irregular ventricular response



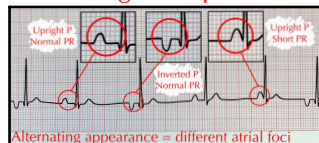
## 3. P WAVES

Are they present? What's the appearance? Do all P waves present appear similar?

### Sinus rhythm



### Wandering atrial pacemaker



### Atrial fibrillation



*From a basic nursing and rhythms perspective. Exceptions may exist in the real world.*

# HOW TO READ AN ECG *Single lead telemetry*

### 8 STEPS TO RHYTHM ANALYSIS

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**R** x2 → 1. Rate &  
2. Rhythm

**P** x2 → 3. P waves &  
4. PR interval

**Q** x2 → 5. QRS &  
6. QT interval


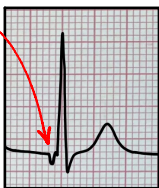
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**STaT** → 7. ST segment &  
8. T waves

### 4. PR INTERVAL

Is it between 0.12 and 0.20 seconds?

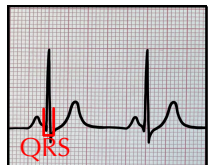
<0.12 sec with inverted P wave  
= possibly junctional?


>0.20 sec = possible AV delay or block?

### 5. QRS COMPLEX

Is it **narrow** (<0.12s) or **wide** (>0.12s)?



Impulse origin above ventricles



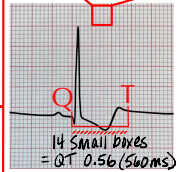
Suggestive of ventricular origin

### 6. QT INTERVAL

Is it within normal limits = <0.44 sec or less than 1/2 the R to R interval?

1mm [ 0.04s (40ms)

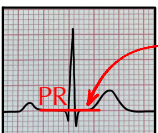
MILLISECONDS (MS)  
40 80 120 160 200




14 small boxes = QT 0.56 (560ms)

### 7. ST SEGMENT

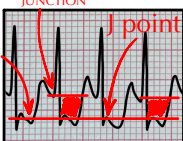
Evaluate for any ST deviation above (elevation) or below (depression) the isoelectric baseline, relative to the PR segment (TP segment in some cases).



PR SEGMENT → ST SEGMENT → J point



PR SEGMENT → ST SEGMENT → J point


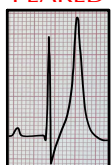
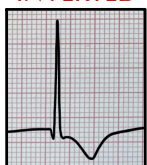
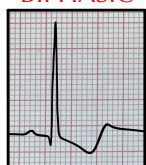


PR/PQ JUNCTION → ST SEGMENT → J point

### 8. T WAVE

Are they normal and upright, or are they abnormal (peaked, flat, inverted, biphasic)?

**NORMAL** **PEAKED** **INVERTED** **BIPHASIC**

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**8 STEPS TO RHYTHM ANALYSIS**  
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**R** x2 → 1. Rate &  
2. Rhythm

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4. PR interval

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6. QT interval

**STaT** → 7. ST segment &  
8. T waves

SINUS:		JUNCTIONAL:		VENTRICULAR:	
BRADYCARDIA	<60	BRADYCARDIA	<40	INTRINSIC	20-40
INTRINSIC	60-100	ACCELERATED	60-100	ACCELERATED	~50-100
TACHYCARDIA	>100	TACHYCARDIA	>100	TACHYCARDIA	>100

SVT = Dependent upon type/location

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1. ATRIAL RATE: \_\_\_\_\_ VENTRICULAR RATE: \_\_\_\_\_

2. RHYTHM: ATRIAL: Regular / Irregular      VENTRICULAR: Regular / Irregular

3. P WAVES: \_\_\_\_\_ 4. PR INTERVAL: \_\_\_\_\_ 5. QRS: \_\_\_\_\_ 6. QT INTERVAL: \_\_\_\_\_

7. ST SEGMENT: Okay / Elevated / Depressed      8. T WAVES: \_\_\_\_\_

**RHYTHM INTERPRETATION:** \_\_\_\_\_

1. ATRIAL RATE: \_\_\_\_\_ VENTRICULAR RATE: \_\_\_\_\_

2. RHYTHM: ATRIAL: Regular / Irregular      VENTRICULAR: Regular / Irregular

3. P WAVES: \_\_\_\_\_ 4. PR INTERVAL: \_\_\_\_\_ 5. QRS: \_\_\_\_\_ 6. QT INTERVAL: \_\_\_\_\_

7. ST SEGMENT: Okay / Elevated / Depressed      8. T WAVES: \_\_\_\_\_

**RHYTHM INTERPRETATION:** \_\_\_\_\_

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**RHYTHM INTERPRETATION:** \_\_\_\_\_