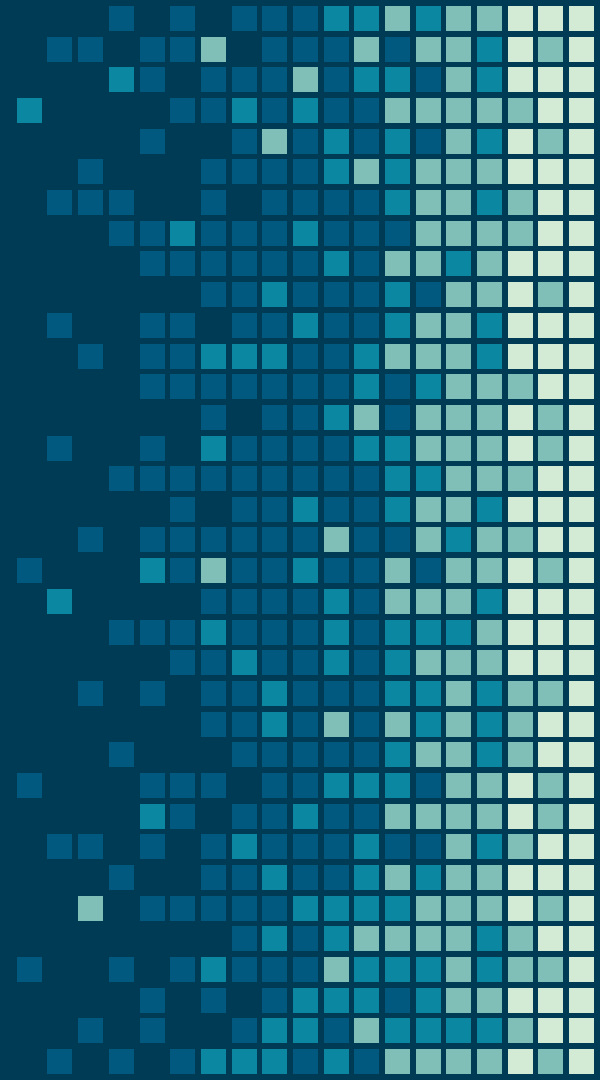


# TELEMETRY BASICS FOR NURSING STUDENTS



“Accuracy of cardiac monitoring...is an important component of patient safety in hospitalized patients who meet the criteria for dysrhythmia monitoring.”

(AACN, 2016, p. e26)

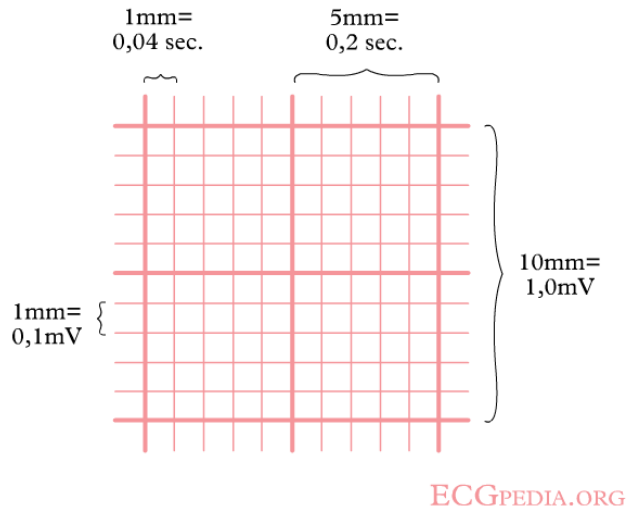
A close-up photograph of a person's hand holding a blue pen, poised to write on a notebook. The hand is wearing a grey, textured sweater. The background is blurred, showing a desk and some papers.

# OBJECTIVES

- Following review of the material, the student nurse will be able to **list the three criteria for a normal sinus rhythm.**
- Following review of the material, the student nurse will be able to **list at least two nursing interventions for abnormal rhythms.**
- Following review of the material, the student nurse will be able to **list one indication for proper telemetry lead placement.**

**Disclaimer: this presentation is not a complete guide to cardiac monitoring and does not replace formal telemetry training.**

# THE STRIP



**The horizontal axis measures time**  
(Lieberman, 2008)

- Little boxes = 0.04 seconds
- Big boxes = 0.2 seconds

**The vertical axis represents electrical strength**

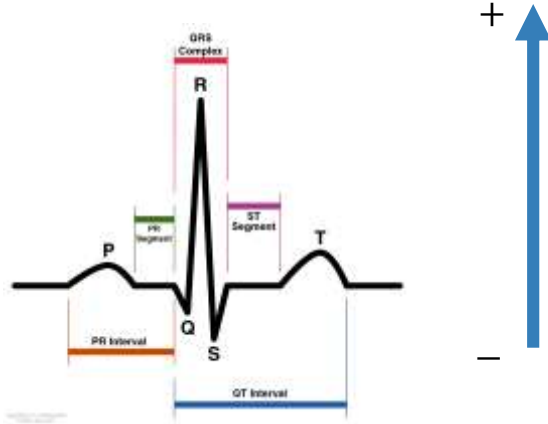
- Little box = 1 millivolt (mV), or 1 millimeter (mm)



# THE LEADS

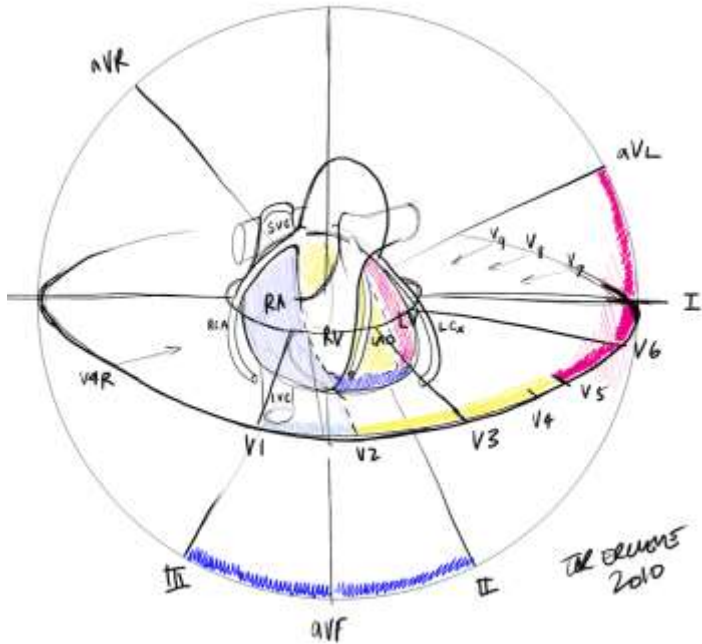
Think of the telemetry leads as a camera looking in through the windows of the house at the heart

- Negative (downward) inflection = current going away from lead (Lieberman, 2008)
- Positive (upward) inflection = current going toward lead



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# UNDERSTANDING LEADS

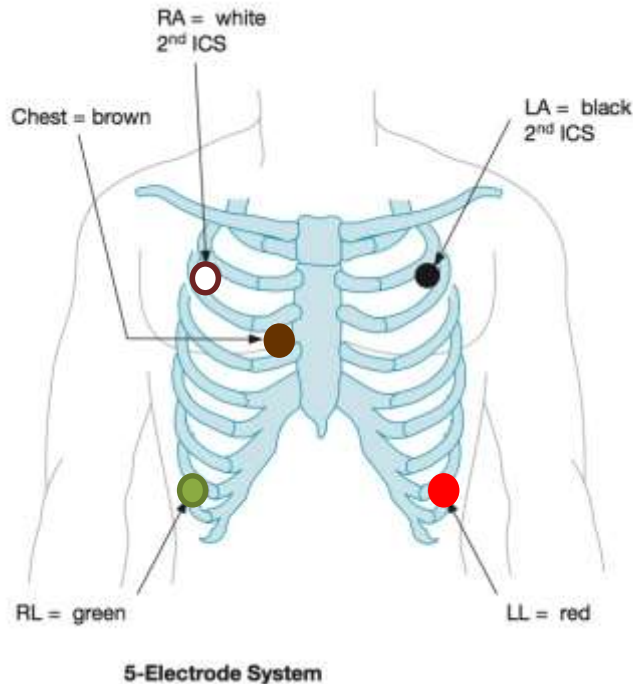


- Leads V1-V6 view the heart in the transverse plane (Lieberman, 2008)
  - called precordial leads
- Leads I, II, III, aVR, aVL, and aVF view the heart in the frontal plane
  - Called limb leads

**Application:** If a heart attack is suspected, knowing the anatomical place the lead is “looking” at can help determine which area is not receiving blood (ischemia).

Ischemia presents as ST segment elevation or depression. See [here for tutorial](#).

# LEAD PLACEMENT



- Loose or incorrectly placed leads may cause false alarms or misdiagnosed rhythms (AACN, 2016).
  - Loose stickers contribute to alarm fatigue
- Use anatomical markers to apply stickers correctly
  - Incorrect lead placement changes the morphology (shape) of the waveform



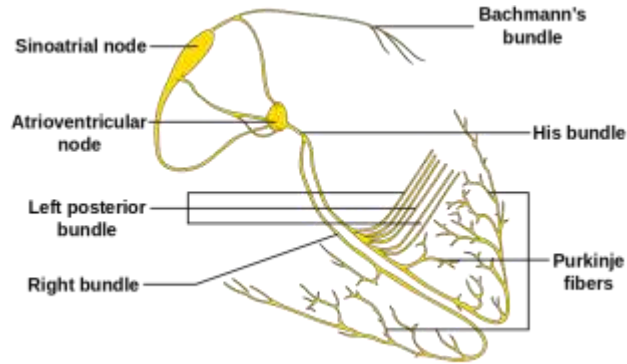
# LEAD PLACEMENT

Proper application of leads:

- Clean sticker sites with alcohol and/or prep tape
- Clip hair if indicated
- Change tele stickers daily with bath

**Application:** assess condition/location of leads during your morning assessment.

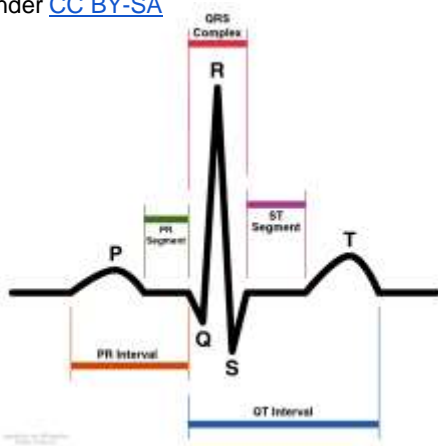




# THE EKG TRACING

- P = Sinus node firing, atrial depolarization
- QRS = Ventricular depolarization
- T = Ventricular repolarization
  - ▣ atrial repolarization hidden in QRS

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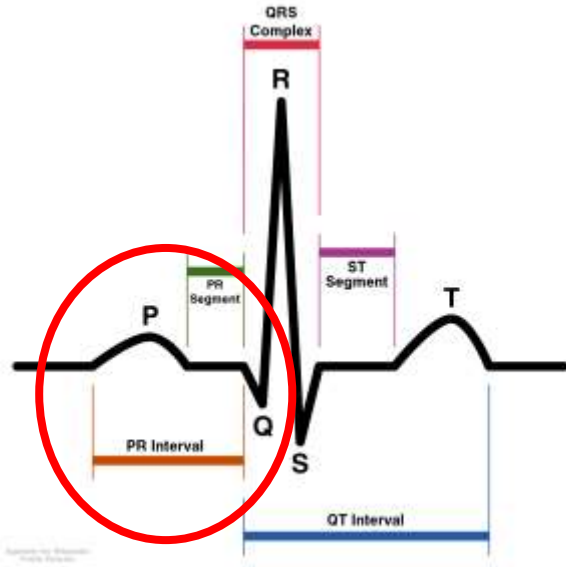


# CONDUCTION DEFECTS

Abnormal conduction from one part of the heart to another is called a *block*

## Sinus node to AV node conduction problem:

- 1°: Delayed conduction:
  - Seen as too long from P to QRS
  - Normal PR Interval (PRI) = 0.12-0.2 seconds
- 2°: Intermittent conduction ("dropped" QRS's)
- 3°: No conduction (patient probably unstable!)

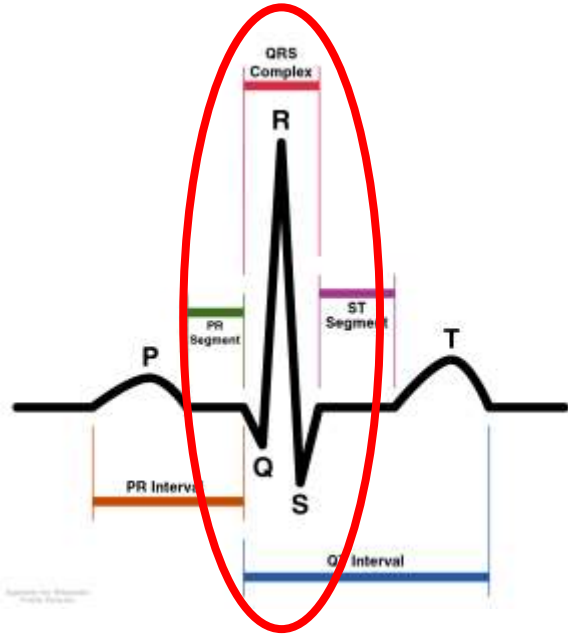


# CONDUCTION DEFECTS

## Bundle branch conduction problem:

- Seen as widened QRS
- Normal QRS = 0.08-0.12
- Can be right, left, or bifascicular block

**Application:** limited clinical significance for beginners unless new left bundle branch block (LBBB).

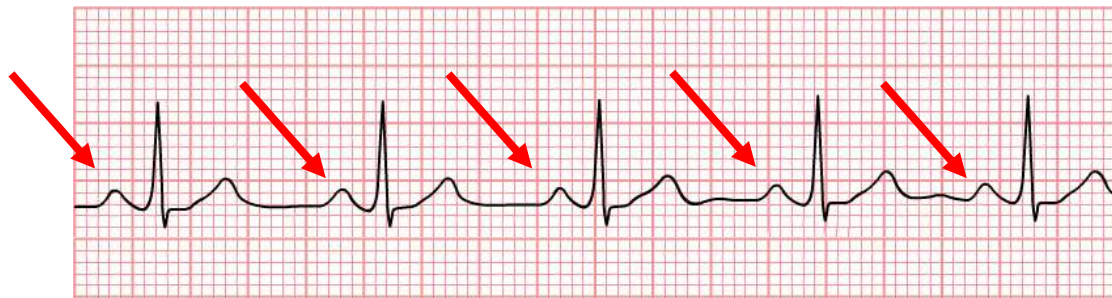


# SINUS RHYTHM

A sinus rhythm means the heart is following the “instructions” of the sinus node

## Indicators of Sinus Rhythm:

1. P before every QRS
2. Regular rhythm (QRS complexes are equal distance apart)
3. If heart rate (HR) 60-100, called *normal sinus rhythm (NSR)*



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# HEART RATE (HR)

- Sinus Tach (ST) = sinus rhythm with **HR >100**
- Sinus Brady (SB) = sinus rhythm with **HR <60**

## Application:

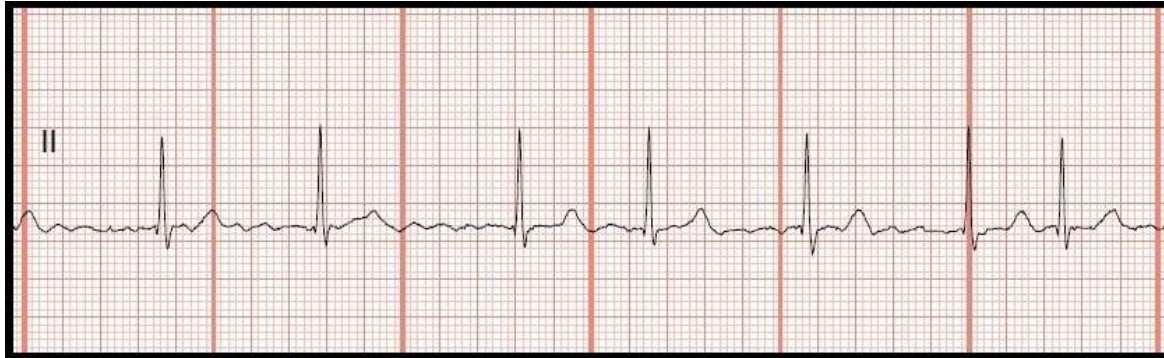
- If your patient has high heart rates, consider physiological factors like pain, bleeding, or missed home medication. If low, may be athletic or too high dose of medication.
- High HR (e.g. > 130) may decrease blood pressure since the chambers cannot fill fast enough
- Check for as needed (PRN) medication orders that might help control rate.

# ATRIAL FIBRILATION (A-FIB)

In A-fib, multiple areas of the atria are sending out impulses, causing irregular heart rate (hallmark of a-fib)

Indicators of A-fib:

- Irregular spacing between QRS complexes
- No distinct P-wave—often has many small impulses that look like artifact



# TREATMENT FOR TACHYCARDIA

## **Application (New-Onset):**

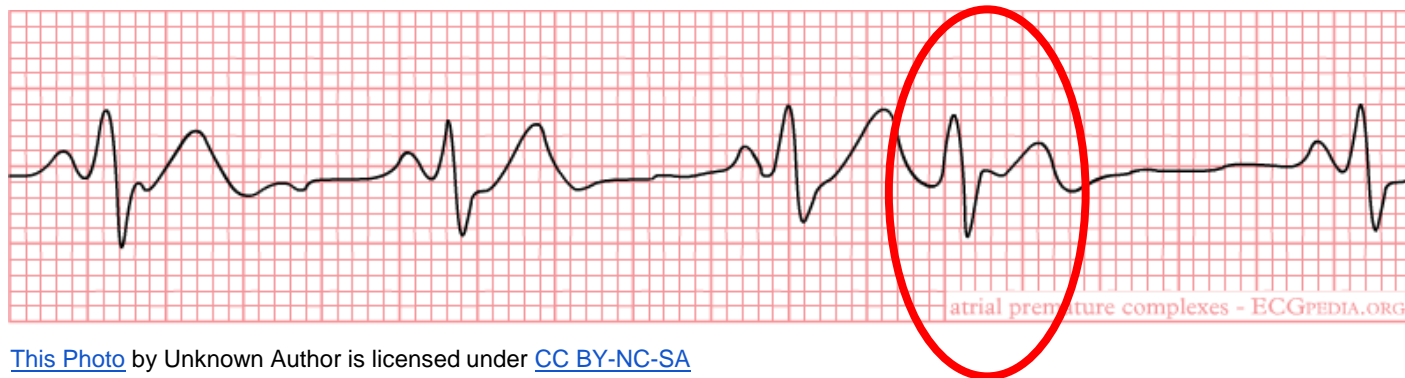
- Usually drops blood pressure (BP) since the atria is not filling the ventricles. Main treatment goal is to decrease HR which should improve BP.
- Any new-onset tachycardia should have 12-lead EKG to determine if a-fib
- Usually need meds for rate control and/or dysrhythmia, and anticoagulation (blood pools in atria)
- Note: this is a very common chronic rhythm in elderly. Treatment is very similar as for new-onset a-fib.

# PREMATURE ATRIAL COMPLEX (PAC)

- A random, early QRS
- *Same morphology (shape)* as the other QRS complexes (indicates impulse traveled through AV node, so came from atria)

## Application

- Frequent or runs of PAC's may warn of irritable heart
  - Check potassium and magnesium level
  - Consider antidysrhythmic meds



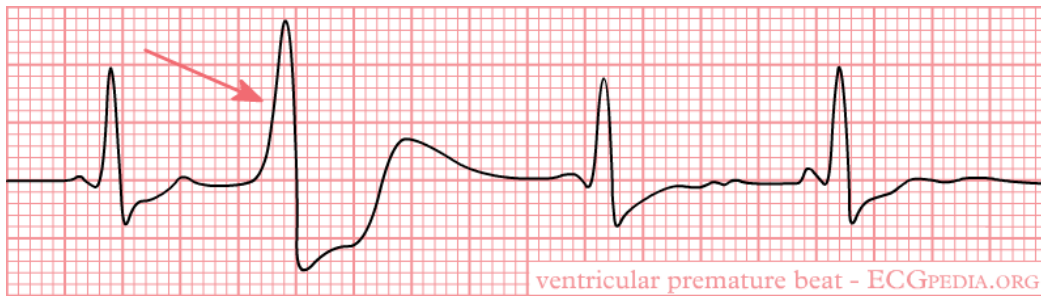


# PREMATURE VENTRICULAR COMPLEX (PVC)

- A random, early QRS
- *Widened QRS and different morphology* (indicates impulse originated *below* AV node)

## Application

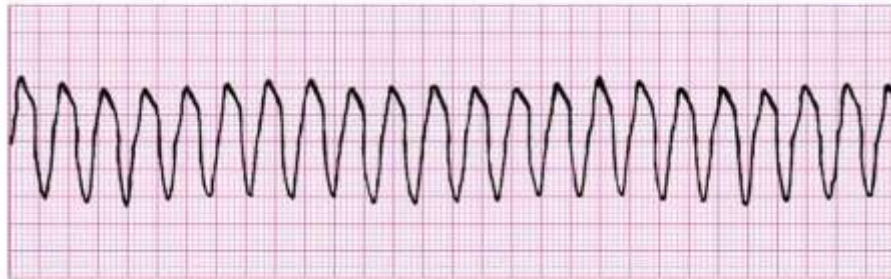
- Frequent or runs of PVC's may warn of irritable heart
  - Check potassium and magnesium level
  - Consider antidysrhythmic meds
- May devolve into ventricular tachycardia (v-tach). Life threatening!



# VENTRICULAR TACHYCARDIA (V-TACH)

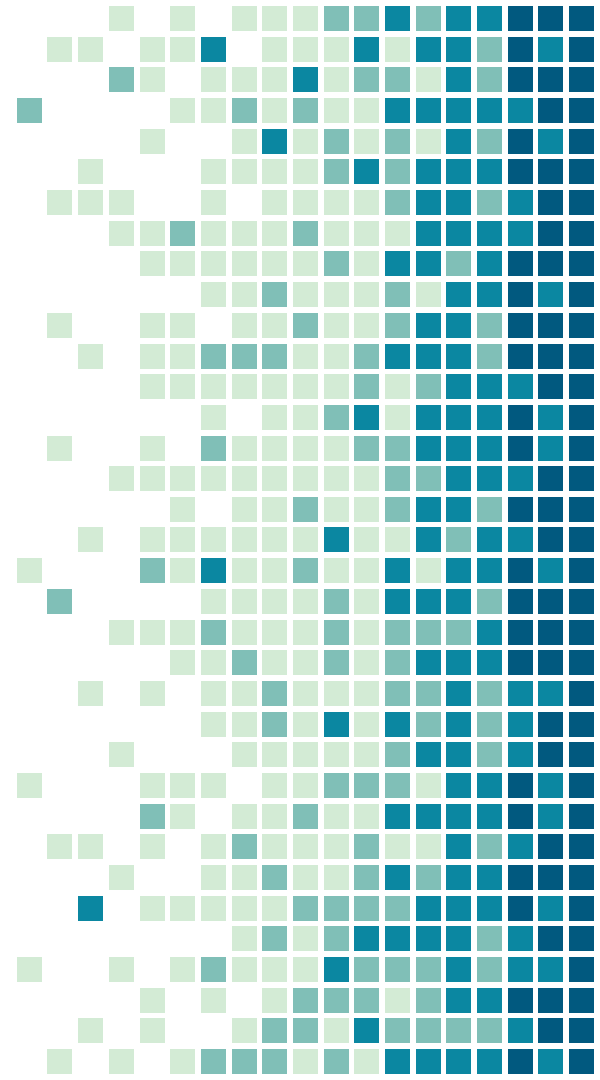
## Life threatening!

- Call code blue and shock as soon as possible!
  - Anyone with BLS may operate the AED
- If untreated, may devolve into ventricular fibrillation (v-fib) and then to asystole.
- Rapid movement (e.g. brushing teeth) may mimic v-tach, so check patient first



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REVIEW

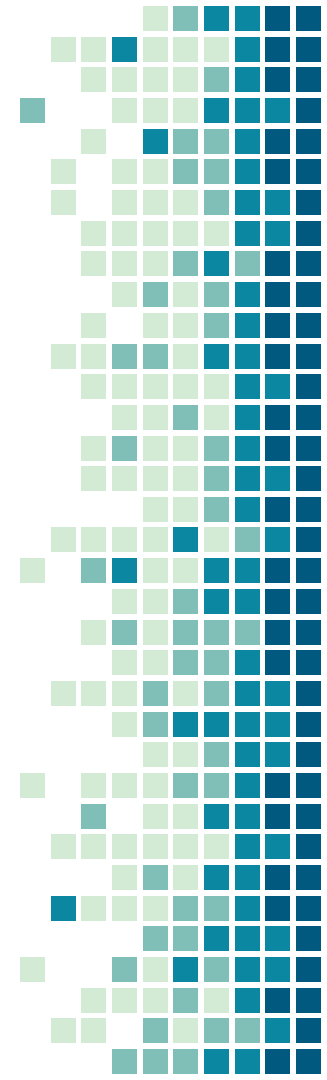


A close-up photograph of a person's hand holding a blue pen, poised to write on a white sheet of paper. The hand is wearing a grey, textured sweater. The background is blurred, showing a desk and a laptop.

# OBJECTIVES

Can you answer these questions now?

- List the three criteria for a normal sinus rhythm.
- List at least two nursing interventions for abnormal rhythms.
- List one indication for proper telemetry lead placement.



# DISCUSSION QUESTIONS

- Are the leads on your patient in the proper location and sticking well?
- What rhythm is your patient in?
- Did you notice any ectopy (early beats)?
- Does your patient have a heart block? (unusual)
- What medications are scheduled or PRN that might affect your patient's rhythm?
- Based on your review of your patient's telemetry/rhythm, what conditions or rhythm changes should you be prepared for?
- What questions do you have for your preceptor?

**Application:** you should be asking yourself these questions anytime you have a monitored patient.

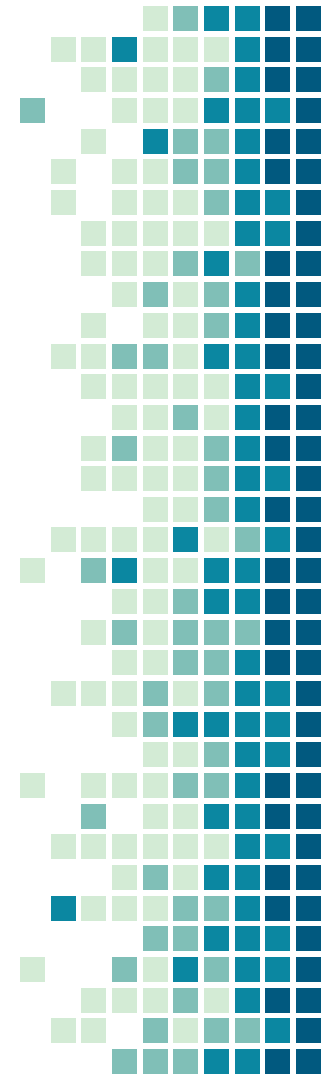
# REFERENCES

American Association of Critical Care Nurses. (2016). Accurate dysrhythmia monitoring in adults. *Critical Care Nurse*, 36(6), e28-e36.

Lieberman, K. (2008). Interpreting 12-lead ECGs: a piece by piece analysis. *The Nurse Practitioner*, 33(10), 28-35.

Both of these articles are highly recommended for the curious.

GL 12.6 (SMOG)





# ABOUT ME

*I wrote this for a BSN teaching project, but really, I love trying to make tough nursing topics easier to understand and apply. I hope this has been useful for you!*

- My name is Mark Nisly
- I work in the Critical Care Float Pool (Supplemental Staff)
- Credentials: RN, CCRN.
- Experience: 8 years RN, 3 years CNA

