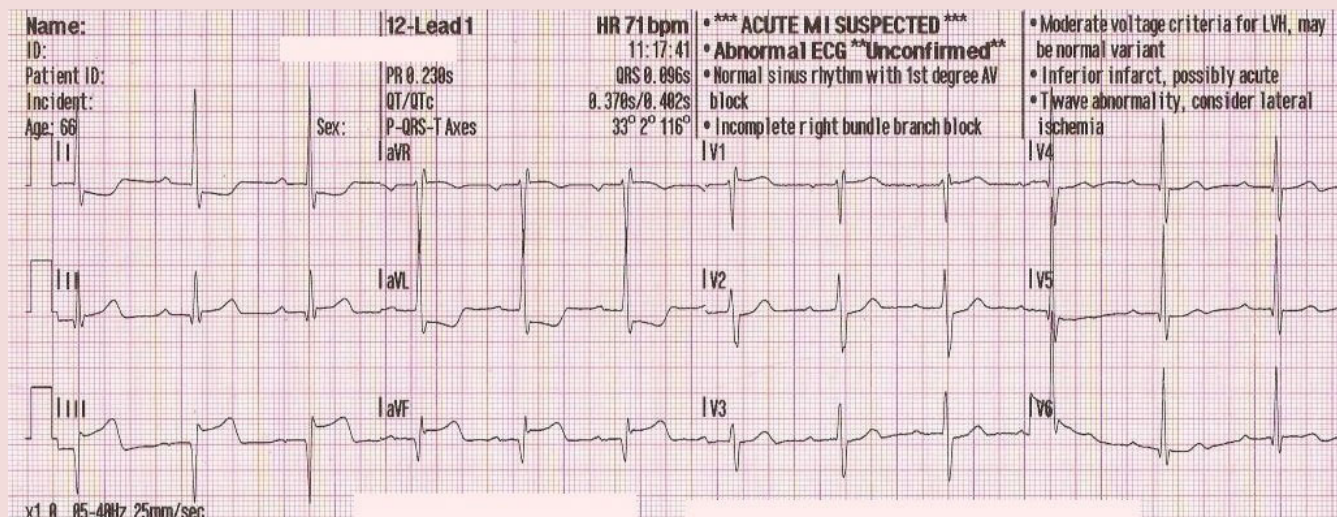




How to get a GREAT ECG!

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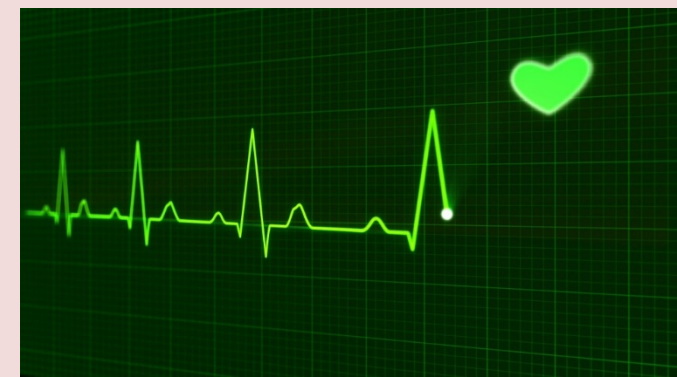
Preparing the patient and lead placement



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Objectives

- Review patient preparation techniques for optimizing ECG quality
- Define anatomical landmarks for ECG lead placement
- Demonstrate correct ECG lead placement





Preparing the Patient for ECG

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Preparing the Patient

1. Make the patient as relaxed and comfortable as possible
2. Calm the patient
3. Explain the procedure



*relaxed patient = better ECG quality



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Preparing the Patient

4. Expose the chest
5. Remove garments
6. Remove accessories that may interfere with ECG





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Preparing the Patient

Remove hair

Shave interfering chest hair (if applicable)

Removing excess hair allows electrode gel to penetrate the skin resulting in a stronger signal





Preparing the Patient

1. Wipe down skin with single use washcloth or gauze
2. Vigorously wipe skin prior to electrode placement

- Reduces skin oil

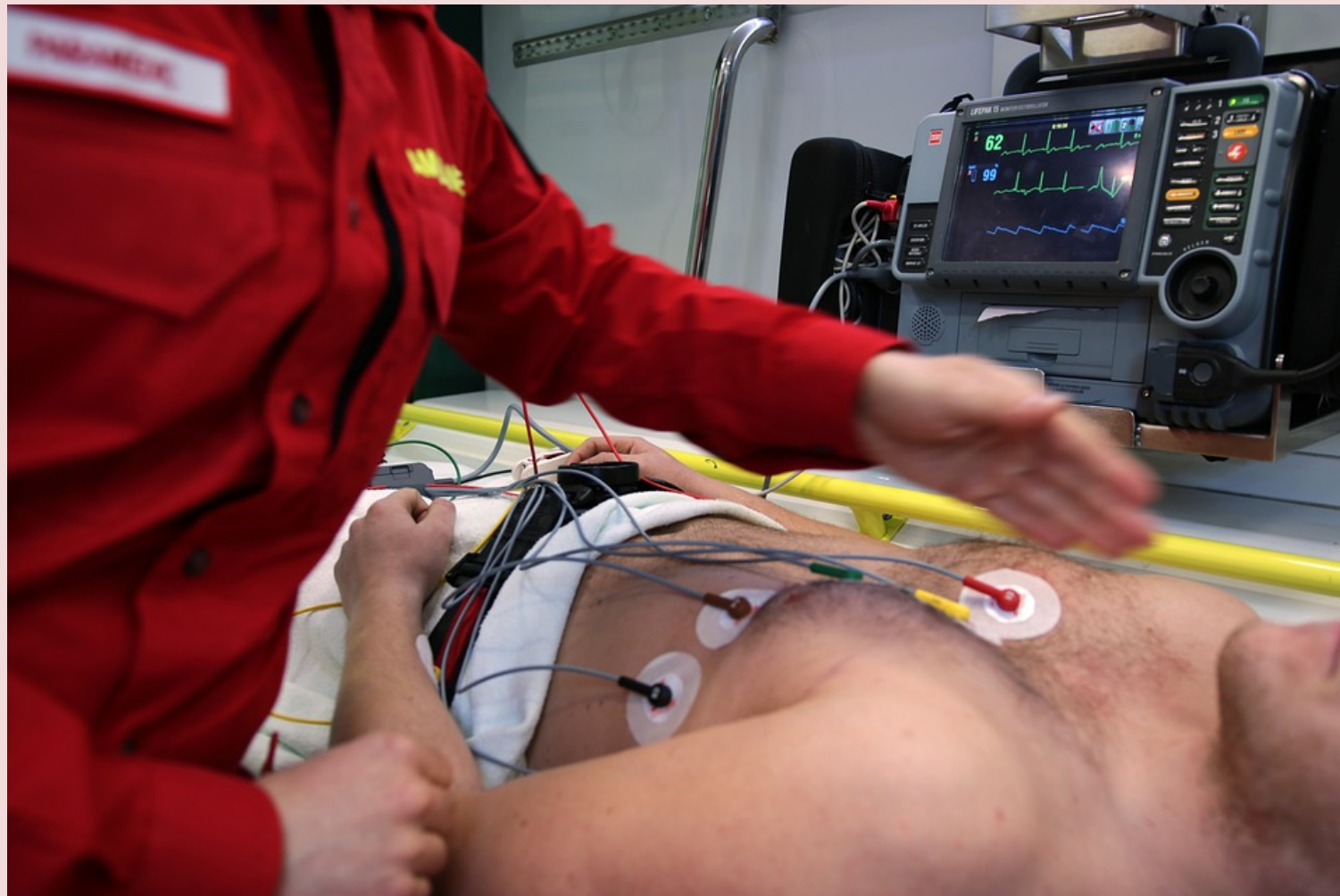
- Abrades the top skin layers for better contact





Applying The Leads!

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Lead Placement

Position The Patient

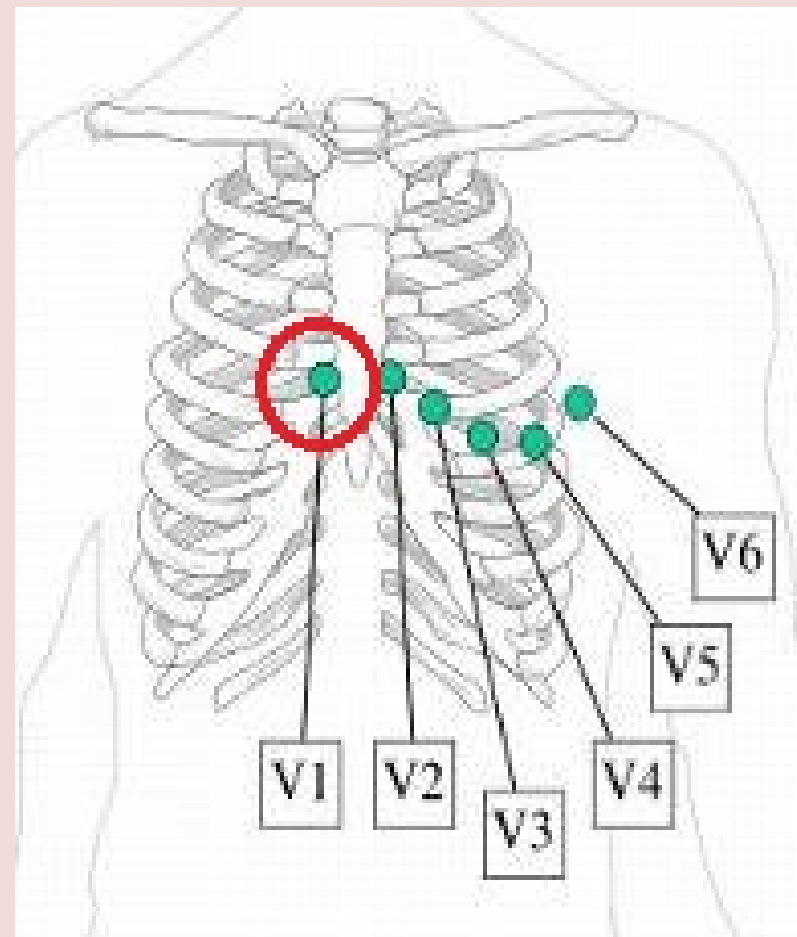
- Place patient supine (or closest position tolerated) for optimal lead placement





Lead Placement

Precordial Leads

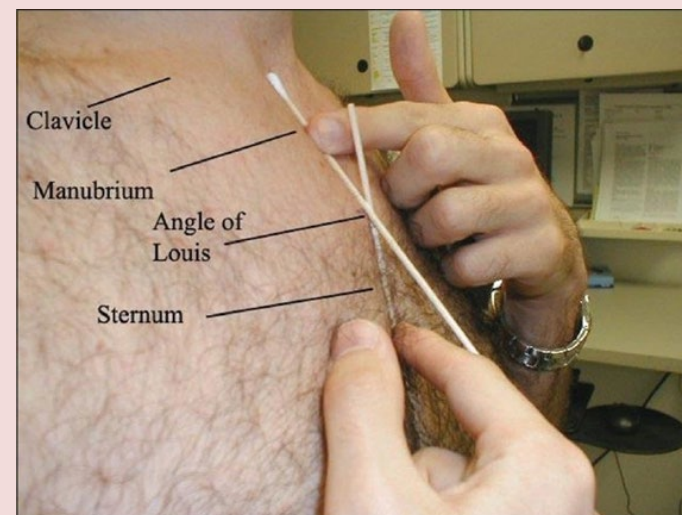
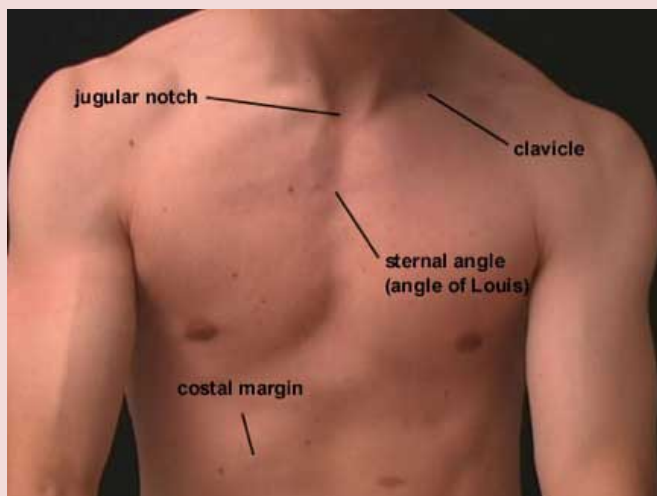




Lead Placement

First Step: Locate the “Angle of Louis”

- Find your jugular notch (valley at base of throat)
- Move finger down until you feel a ridge (that’s it!)





Lead Placement

Found your angle? Great! It's time to start applying the leads!

Tips before we begin:

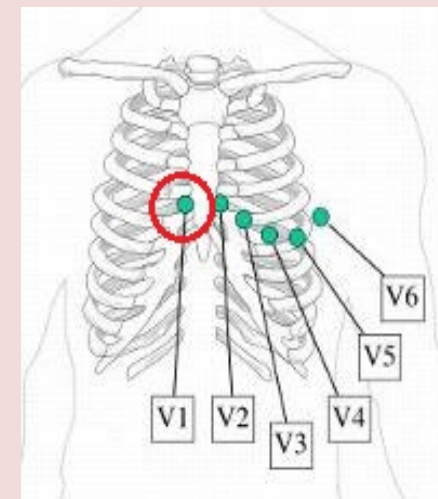
- Minimize the time the electrode leads are exposed to air
- In patients with breast/chest tissue, do NOT alter the positioning of the electrodes. Place the leads on the breast tissue if lead positioning is compromised by going below.



Lead Placement

Second Step: Find V1

1. Move from the Angle of Louis to the gap on the right
this is your 2nd intercostal space
2. Move down two rib spaces to the 4th intercostal space
3. Place your lead where the space meets the right sternal border





Lead Placement

Third Step: Place Leads V2-V4

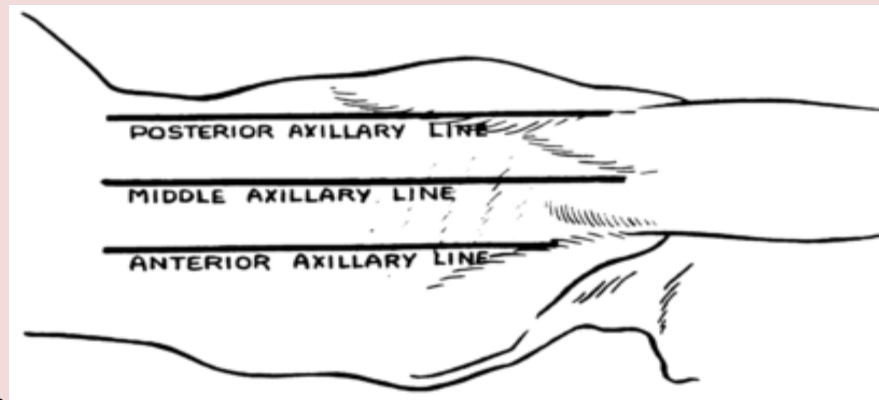
1. V2: Place next to sternum in the 4th intercostal space on LEFT side
2. V4: Place in 5th intercostal space on the left, at the mid-clavicular line
3. V3: Place mid-way between V2 and V4



Lead Placement

Fourth Step: Place Leads V5 and V6

1. V5: Place next to v4 in the same horizontal plane at the left anterior axillary line
(in-line with crease of arm)



2. V6: Place next to v5 in the same horizontal plane at the left mid-axillary line
(in the center of the under-arm area)



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Lead Placement

The Final step: Limb Leads

They must be placed **ON THE LIMBS**, not the torso





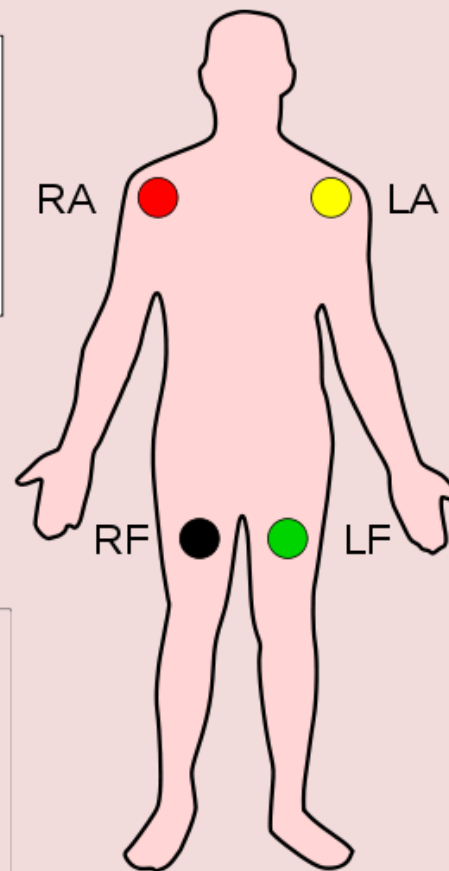
Lead Placement

The Final step: Limb Leads

- Place as proximal as possible
- Upper extremity leads should be placed distal to the deltoid
- Lower extremity leads should be placed distal to the inguinal line

RA = Right Arm
LA = Left Arm
RF = Right Foot
LF = Left Foot

A



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Acquiring the ECG

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Acquiring the ECG

Prepare For Excellence!

Wire Management

- Ensure the wires are fanned out
- Ensure the wires are slack and free of obstruction
- Connect lead clips to clothing to minimize movement

Position Patient

- Supine or semi-recumbent if tolerated
- Head back on stretcher,
- arms resting at sides



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Acquiring a GREAT ECG

You're almost ready!

- Ensure the patient is relaxed
- Ensure the patient is not talking or moving
- Ensure that YOU are not moving
(or driving)

Capture a GREAT ECG!





Troubleshooting Artifact

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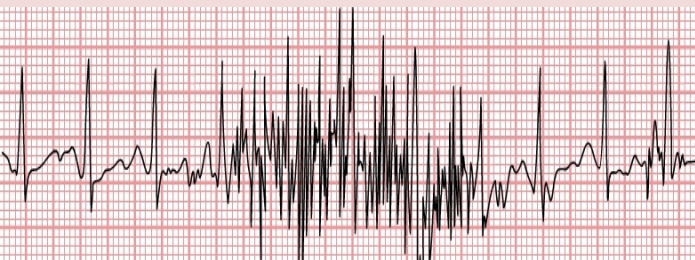
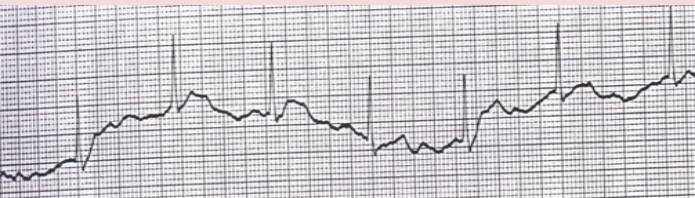
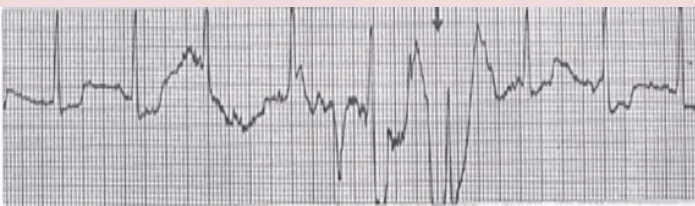
Types of Artifact

- Motion artifact
- Muscle artifact
- Missing lead
- Electromagnetic interference



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Motion Artifact



Low Frequency

Isolated – possibly due to patient motion, try to get patient to stay still

Prolonged - possibly due to respiration
(have patient hold their breath)

High Frequency

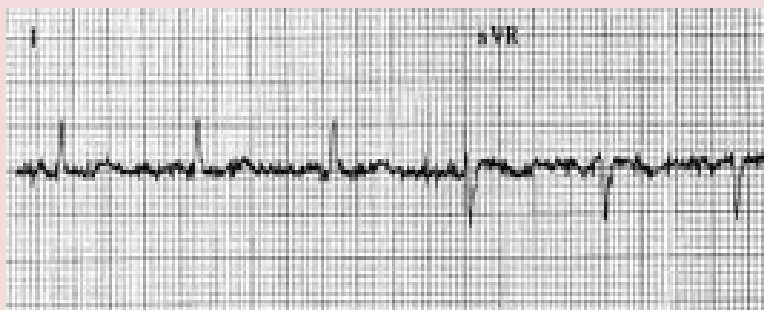
Possibly due to ambulance motion, are you transporting?

If not, is there something causing the patient to move rapidly?



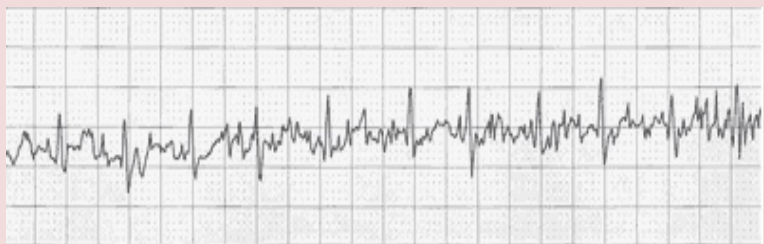
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Muscle Artifact



Muscle Tension

Determine and treat underlying cause:
i.e. Is patient in pain? Are they anxious?



Muscle Tremor

Is the patient shivering? Consider treating the cause.

Electrode on a spasming muscle? Consider moving it if possible



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Missing Lead

Missing Lead

Check for:

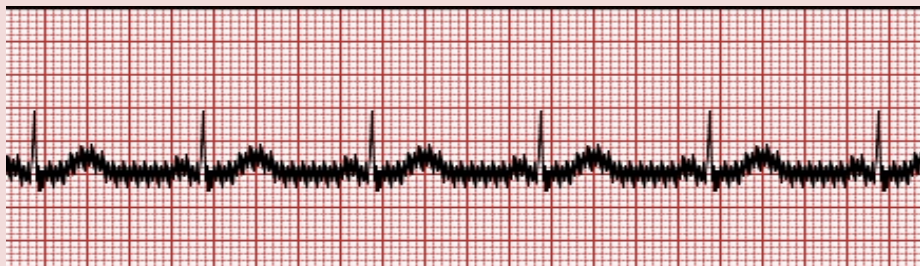


- Leads and wires connected
- Dry electrodes? (poor contact)
- Cable failure? (consider swapping for spare)
- Connectivity issue? (chest hairy, skin oily/wet?)
- Machine issue? (consider service call)



Electromagnetic Interference

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Interference such as this may be seen next to a power line



Interference such as this may be seen next to a cell phone or other such devices



So you got a great ECG, now what?

- Make sure the patient's age and gender are entered correctly as this can affect software interpretation.
- Review the ECG yourself; what is your interpretation?
 - If you cannot interpret the ECG due to quality issues, neither can the software – REPEAT!
- Keep the leads on!
 - Be prepared to repeat the ECG, especially if you have a high suspicion for STEMI, an initial non-diagnostic ECG, or if the patient's clinical condition changes.



Summary

- Prepare your patient by relaxing them and prepping their skin for electrode placement.
- Proper lead placement is essential:
 - Precordial lead landmarks should be palpated.
 - Limb leads must be placed on the extremities, NOT the torso.
- Reduce patient movement and activity.
- Know how to troubleshoot artifact.
- Be ready to repeat the ECG, especially if your suspicion for STEMI is high.