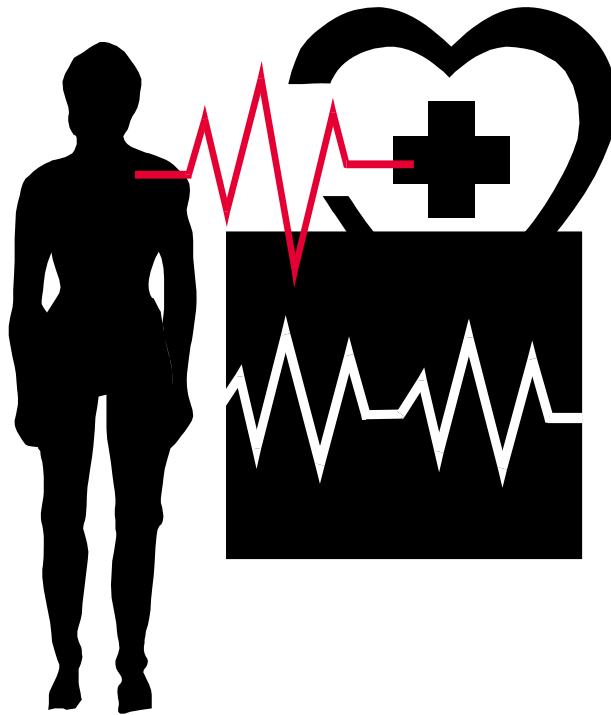


Self-Learning Packet

12 Lead ECG: Applying and Maintaining Electrodes



Learning Objectives:

After completion of the self-learning packet you will be able to:

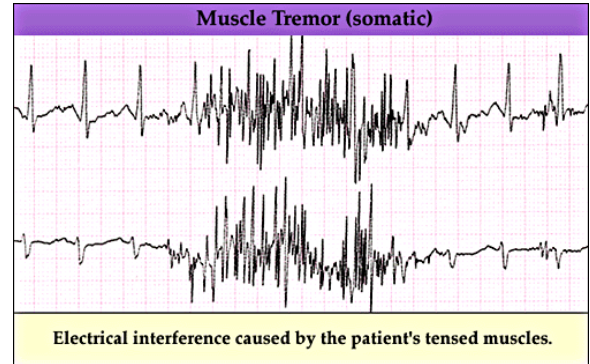
- Explain the reasons why proper skin prep and electrode application and maintenance are important
- Describe the proper skin prep
- List DOs and DONTs to keep in mind when applying electrodes
- Place the 10 ECG leads correctly on the patient
- Describe proper maintenance of electrodes

Part One: How Telemetry works?

- When the heart beats, a small amount of electrical current follows a special pathway of conduction fibers in the heart and then spreads out through the heart muscle, causing it to contract. The electrodes used for electrocardiograms pick up this electrical current and send it through the lead wires to the transmitter. The signal is turned into the ECG tracing on graph paper.
- Everyone's ECG is unique. The patient's physical size, skin type, age, and pathology as well as where the electrodes are placed influence the appearance of the tracing.

What is noise or artifact?

- Anything that interferes with the strength and consistency of the electrical current can interfere with the quality of the ECG. Poor signal quality causes noise or artifact on the ECG, which in turn leads to inaccurate analysis of the ECG.
- An example of an ECG with artifact or noise is shown on the right



Conditions leading to poor ECG signals include:

- 1. An increase in resistance to the conduction of the electrical signal**
Causes include:
 - Build up of skin oils and residues
 - Drying or smeared electrode gel
 - Using different brands of electrodes (resistance varies from brand to brand, and the signal is best when an equal signal comes from all electrodes)
- 2. Poor contact of electrode with the skin**
Causes include:
 - Poor skin prep (especially not clipping hair)
 - Diaphoresis (moist patient skin, sweating)
 - Pulling on the cables
- 3. Muscle movement**
 - This is increased by placing electrodes over bones or in areas where there is a lot of muscle movement

REVIEW OF KEY POINTS

- Most problems with poor ECG signals come from noise or artifact. The biggest causes of noise or artifact are increased resistance, poor electrode contact and muscle movement.
- Good skin prep is important because it reduces the skin's natural resistance to conduction of the heart's electrical signal. Clipping hair prior to application of electrodes also helps ensure good electrode contact.
- Proper placement of electrodes will help reduce interference of artifact cause by movement.

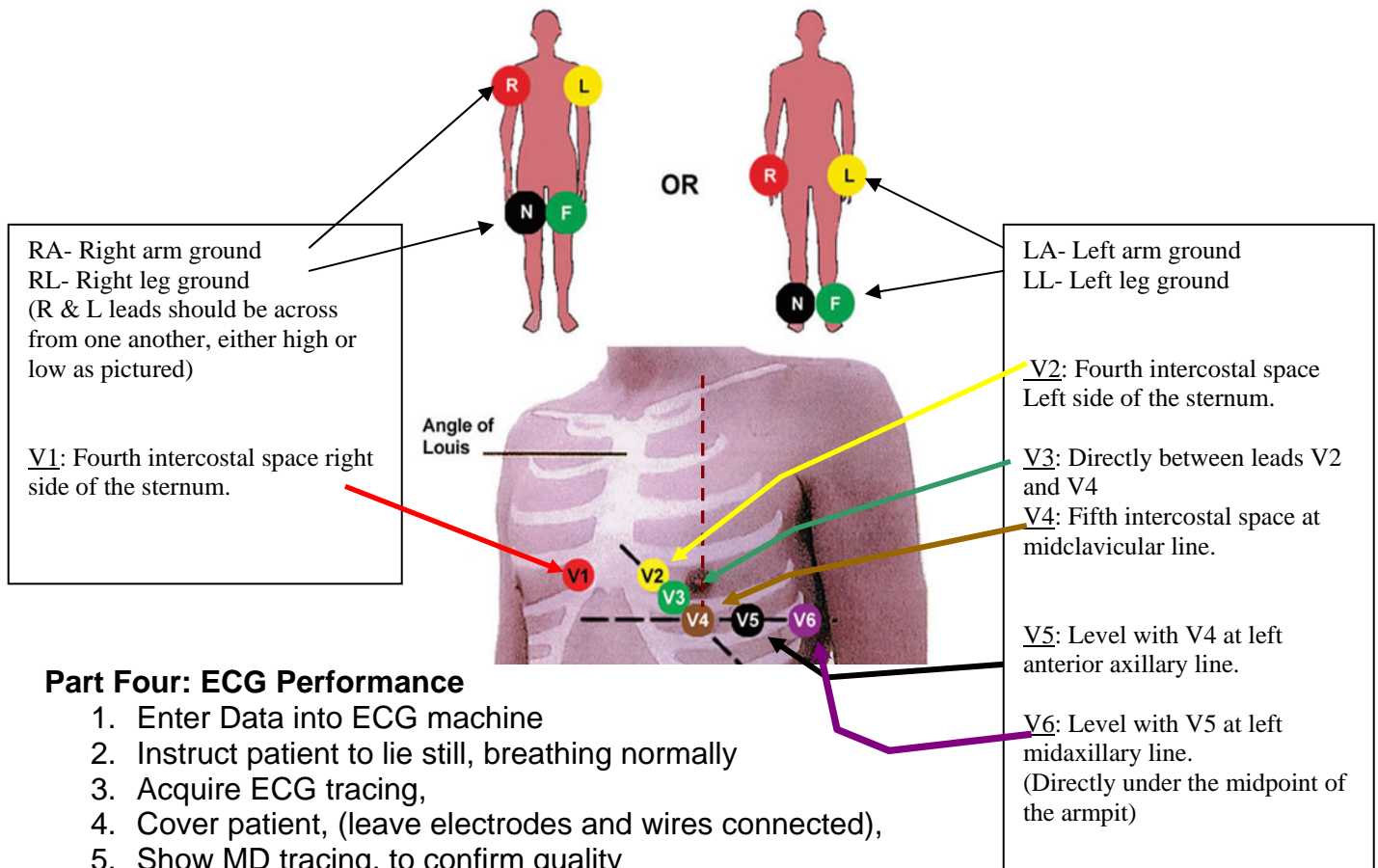
You can affect all of the above. Studies have shown that when electrode maintenance and application are optimal, improved tracings are obtained.

Part Two: Position patient: lying flat or with slight elevation, can be done sitting up if patient is short of breath or difficulty lying flat.

Applying Electrodes

- **Good Skin Prep:**
 - Clip hair if present. This allows for better contact and less painful removal of patches. (Note: Avoid shaving as this may increase skin irritation under the electrode)
 - Wash the skin with soap and water.
 - Rinse then dry briskly to remove dead cells and oils.
- **Some Dos and Don'ts for electrode application**
 - DO use all the same types of electrodes.
 - DO check to make sure it is fresh and moist.
 - Do place electrodes in bag to prevent drying out.
 - DO apply electrodes and assure good adhesion.
 - DO support the transmitter and if necessary tape the lead wires to prevent pulling on electrodes.
 - DO NOT use alcohol or other skin products on the skin.
 - DO NOT place electrodes over:
 - Bones
 - Skin areas where there is a lot of muscle movement.
 - Pacemakers – place 2-3 inches away from pacemaker.
 - Irritated skin
 - Incisions

Part Three: Lead Placement



Part Four: ECG Performance

1. Enter Data into ECG machine
2. Instruct patient to lie still, breathing normally
3. Acquire ECG tracing,
4. Cover patient, (leave electrodes and wires connected),
5. Show MD tracing, to confirm quality
6. Disconnect patient and remove electrodes.
7. Document in patient chart and on routing slip/billing record