How to perform a high quality ECG
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ECG Equipment

- Technomed approved Electrodes
- Disposable Gloves
- Razors
- Yellow bin
- Patient Prep Pads
- Tissues
- Couch blue roll paper

Check the electrode gel to make sure it is fresh and moist. Always make sure you store electrodes properly, as they will dry out if left exposed to the air. Electrodes are packaged in metal foil pouches to prevent gel evaporation, therefore it is important to remember the following:

1. Use electrodes prior to their expiration date
2. Do not remove the electrodes from their pouch until they are ready to be used.
3. Do not place electrodes in open bins or drawers. If a pouch is already open, place it in a zip lock bag to preserve moisture and prevent evaporation.
4. Avoid warm storage areas.
5. Do not use different brands of electrodes during a test. Resistance varies from brand to brand, and the signal is best when an equal signal comes from all of the electrodes.
Patient Explanation

Talk calmly to your patient, letting them know what you are going to do, in doing this you are helping to relax.

introduce yourself “My name is .....................”

Ask them how they wish to be addressed “Is it OK for me to use your first name”

Ask them to remove the required items of clothing to allow access then ask them to lie on the couch

Explain what is going to happen

“I am going to take a short 10 second recording of your heart. This will be painless. I need you to relax. If your are uncomfortable at any point please tell me.”

“I will be attaching electrodes to your wrist and ankles together with a set of electrodes on your chest. In order to do this you will need to remove your top. (in case of females “you may keep your bra on”)”

“I will need to prepare your skin where I will be attaching the electrode. I may need to shave this area.”
Perform Good Skin Preparation

Build up of oils and everyday residues on our skin increase the resistance to conduction of the electrical signals from the heart.

The following steps should be followed in order to prepare the skin properly:

1. If hair is present, shave the area. This gives better electrode contact, and reduces pain on removal.

2. Rub the area vigorously with an electrode skin prep pad. The pad contains both an abrasive and alcohol which effectively decreases the skin’s electrical resistance.

3. There should be a small amount of reddening of the skin. This will ensure that the heart’s electrical signals can travel to the electrodes.
Where do I put the Electrodes (Limb Leads)?

**Note:** Do not place electrodes over bones or areas where there is a lot of muscle movement. Proper placement of electrodes will help reduce interference of artefact caused by movement.

**Limb Leads**
- RA – On the left arm, avoiding thick muscle
- LA – On the left arm, avoiding thick muscle
- RL – On the right leg, lower leg (when possible)
- LL – On the left leg, lower leg (when possible)

In ECG configurations, leads I, II and III are called limb leads. The electrodes that form these signals are located on the limbs—one on each arm and one on the left leg. The limb leads form the points of what is known as Einthoven’s triangle.

**Lead I** is the voltage between the (positive) left arm (LA) electrode and right arm (RA) electrode
**Lead II** is the voltage between the (positive) left leg (LL) electrode and the right arm (RA) electrode
**Lead III** is the voltage between the (positive) left leg (LL) electrode and the left arm (LA) electrode
Where do I put the Electrodes (Chest Leads)?

V1 – In the fourth intercostal space (between ribs 4 and 5) just to the right of the sternum (breastbone).
V2 – In the fourth intercostal space (between ribs and 5) just to the left of the sternum (breastbone).
V3 – Between V2 and V4.
V4 – In the fifth intercostal space (between ribs 5 and 6) in the mid – clavicular line.
V5 – Horizontally even with V4 in the left anterior axillary line.
V6 – Horizontally even with V4 and V5 in the midaxillary line.

**Clinical note:** For female patients, lateral chest electrodes should be placed underneath the left breast.
Muscle Movement on ECG

1. To reduce muscle tremor it is important to ensure the patient is warm, relaxed and does not move, whilst performing the ECG – movement can impair the quality of the ECG.

2. When a patient is cold, he/she may tense or shiver which can cause muscle artefact on the tracings.

3. Ask the patient to place their arms flat along the side of their body. Larger patients might tense their arms if they do not fit on the table, so just ask them to cross their arms across their stomach, to reduce muscle tension.

4. If the patient is sweating, you will need to dry the skin, as moist skin cause poor electrode contact.

5. Ask your patients to breath calmly. Low-frequency noise, such as that produced by respiration, causes the tracing to wander above and below the baseline.
AC Interference

1. Check Alligator Clips – these should be cleaned before use. Gel build up on the electrode alligator clips can occur over time and could affect conductivity. Alligator clips should rest flat on the patient’s skin. For good conduction, make sure the metallic side is in contact with the skin.

2. Check lead wires – inspect cables and wires for breaks and cracks, occasionally wires do need to be replaced.

3. Lead wires should not be pulling on the electrodes as it will result in poor contact with the skin. Untangle wires or reposition electrodes if necessary.

4. Check the Patient cable is connected to the ECG machine securely and that no gaps exist between connectors.

5. Check for AC interference 50/60 Hz this looks like small regular peaks and produces a wide, fuzzy baseline. (see ECG example). Make sure power cables are kept well away from both patient, bed and ECG leads.
There may be Electrical wires in the walls, ceiling or the floor - Move the examination table away from walls.

If there is other electrical equipment in the room - Unplug any equipment which could interfere with the ECG signal: this could be:

Electrical beds, Surgical head lights, Chargers for PC.

Operate the ECG machine on battery

Notes: