Guidelines for Troubleshooting ECG Monitoring Problems

**WANDERING BASELINE**

1. Check electrode site selection. Site selection is key in patients with heavy or labored breathing. If possible, move electrodes to sites that will minimize electrode movement.
2. Is the patient moving excessively? Is patient's breathing labored? Encourage the patient to relax and breathe using the diaphragm rather than chest expansion.
3. Is the monitor in diagnostic mode rather than monitoring mode? Changing to the monitoring mode can reduce respiratory artifact.
4. Check the electrodes to see if they have dried out. If so, replace.
5. Patient Cable movement? If the patient cable is moving excessively, wandering baseline can occur. If possible, secure the cable with a garment clip or safety pin.
6. Lead wire movement? If possible, lead wires should be secured to eliminate movement. Lead wires should be checked for wear. If the lead wire has been used for an extended period of time, connections can become “stretched” causing excessive lead wire movement.
7. Has proper skin prep been performed? With most skin types, no skin prep is required. However, patients with excessively oily skin may require prepping with an alcohol or acetone wipe. Loss of contact may result if the solution is not allowed to dry completely and is trapped under the electrode. Placement sites should be shaved in excessively hairy patients.
8. Skin impedance varies greatly from patient to patient. Even with proper skin preparation, a patient with high skin impedance may cause a delay in receiving a stable trace.

**INTERMITTENT TRACE**

1. Check connections:
   a. Is the cable fully inserted into the monitor?
   b. Are the lead wires fully inserted into the cable?
   c. Are the lead wires securely attached to the electrodes? If the lead wires have been used for an extended period of time, the connections can become “stretched” causing intermittent contact.
2. Are the electrodes dry? If so, replace.
3. Are the electrodes securely attached to the patient's skin? Is additional skin prep required?
4. Check for damaged lead wires and cables. Use a continuity tester.

**NO TRACE**

1. Check gain control for proper setting.
2. Check brightness control for proper setting.
3. Check lead selector switch. Make certain it is in the “on” position.
4. Are the electrodes dry? If so, replace.
5. Is the correct patient cable being used?
6. Check the lead wires and cables for damage. Use a continuity tester.
7. Check connections:
   a. Is the patient cable fully inserted into the monitor?
   b. Are the lead wires fully inserted into the patient cable?
   c. Are the lead wires securely attached to the electrodes?
8. Are the electrodes securely attached to the patient? Is additional skin prep necessary?
9. Suggest that a technician check monitor function according to the manufacturer's specifications.
WEAK SIGNAL
1. Is the gain control adjusted correctly?
2. Is the signal a normal complex for the patient?
3. Check the electrode site selection. Improper positioning of the electrodes can affect trace amplitude.
5. Are the electrodes securely attached to the patient? Is additional skin prep necessary?
6. Are the electrodes dry? If so, replace.
7. Check for lead wire and patient cable damage. Use a continuity tester.

A. C. INTERFERENCE
1. Is the gain control set too high?
2. Check the surrounding area for electrical devices (T.V., radio, small appliances). If possible, move them.
3. Check with the hospital engineer to determine if there is concealed wiring in the walls of the room where you are using the monitor. A fully shielded patient cable is recommended.
4. Check to see if ungrounded electrical equipment is plugged into the same outlet.
5. Are the electrodes securely attached to the patient? Was proper skin prep performed?
6. Are the electrodes dry? If so, replace.
7. Check for patient cable and lead wire damage. Use a continuity tester.
8. Check lead wire/patient cable/electrode connections.
9. Is a five-lead patient cable being used to monitor three leads? If so, the open receptacles should be plugged.
10. Is the patient cold or nervous? Muscle tremors can cause interference.
11. Is the patient touching metal or a nearby wall during monitoring?
12. Is the nurse or doctor touching the electrode during monitoring?

R. F. INTERFERENCE
1. Reduce excessive wire lengths. Longer wires can act as antennas for R.F. current. If long wires are used, coil the excess wire. In this case when we speak of wires, they include:
   a.) wires for Electrosurgical pens
   b.) patient cables
   c.) lead wires
   d.) cables for Electrosurgical grounding pads
2. Check all wires for damage.
3. Wires must not run parallel to or cross over cables for the Electrosurgical generator. If they do, capacitive coupling may occur.
4. Wires must not touch a conductive surface (I.V. pole, metal table, etc.).
5. The monitor and Electrosurgical generator must be as far apart as possible.
6. Power levels for the Electrosurgical generator should be set at a reasonable level.
7. Spark gap electrosurgical generators can cause greater interference.
8. Use shielded lead wires and cables.

EXCESSIVE HEART RATE ALARMS
1. Check alarm setting to ensure that it is appropriate for the patient being monitored.
2. Check lead wire/patient cable/electrode connections.
3. Are the electrodes securely attached to the patient? Was proper skin prep performed?
4. Check electrode site selection.
5. Secure patient cables and lead wires. Excessive movement can cause a heart rate alarm.
EXCESSIVE LEAD FAULT ALARMS

1. Check the lead wire/patient cable/electrode connections.
2. Check the lead wires and patient cables for damage. Use a continuity tester.
3. Are the electrodes securely attached to the patient? Was proper skin prep performed?

SKIN IRRITATION & ELECTRODE ADHESION

SKIN IRRITATION

1. Did the patient have a rash or skin irritation prior to the electrode application?
2. Was a residue of prepping solution (acetone, alcohol, etc.), adhesive remover, skin lotions or conditioners trapped under the electrode?
3. Was an excessively harsh skin prep used (dental burr, coarse sandpaper, etc.)?
4. Is the patient sensitive to certain gels, adhesives or prepping solutions?
5. Has the electrode site been used repeatedly?
6. Has additional and/or different gel been added?
7. Has an additional and/or different adhesive medium been used?
8. Does the electrode gel contain an excessive high chloride concentration?
9. Were the electrodes used while electrosurgery was performed? R.F. current can cause irritation or heating under the electrode.
10. Check for DC leakage from the monitor.

ELECTRODE ADHESION

1. Check the electrode site selection. Diminished adhesion can occur if electrodes are placed over bony areas or creases and folds in the skin.
2. If acetone or alcohol was used and a sufficient drying time was not allowed, adhesion will be affected.
3. Was additional gel added? Gel on the adhesive area can cause loss of adhesion.
4. Were the lead wires attached after the electrodes were applied to the patient? Excessive pressure on the electrode caused by the force needed to attach the lead wire can lift the electrode from the skin.
5. Is the weight of the lead wires or patient cable putting a strain on the electrode causing the electrode to pull away? Where possible, secure the cables and wires.
6. Is the patient diaphoretic? If so, drying of the skin before electrode application is recommended.