3.7 EEG system maintenance and troubleshooting

- Maintaining an EEG system and troubleshooting issues are critical for ensuring accurate data collection and extending the lifespan of the equipment. Below is a guide to **EEG system maintenance and troubleshooting**

3.7.1 Maintenance of an EEG System:

EEG technician should perform a routine inspection procedure prior to daily use. This includes:

1. Machine turn on warm up.
2. Calibration set, usually 100 µV and observation of rectangular pulse on all channels (pen recorder).
3. Sensitivity set (system and individual channel) for proper deflection corresponding to 100 µV.
4. Pressing and holding calibration switch to observe time constant decay.
5. Grounding all inputs to observe zero signal on all channels.

- Individual manufacturer's operation and maintenance manuals give specific calibration and maintenance procedures.
- Electrical/electronic and mechanical faults are actually rare occurrences in clinical EEG machines.
- ECG machine faults occur much more frequently due to higher usage, but even these are relatively few.
- Manufacturer's troubleshooting trees (charts) are often helpful.

3.7.2 Troubleshooting an EEG System:

1. Poor Signal Quality

- **Problem:** Weak, noisy, or flat EEG signals.
- **Solution:**
  - ❖ Check electrode placement and ensure good contact with the scalp.
  - ❖ Reapply conductive gel or paste if necessary.
  - ❖ Verify that the impedance levels are within the acceptable range (typically <10 kΩ for clinical systems).
  - ❖ Check for loose or damaged cables.

2. Excessive Noise or Artifacts

- **Problem:** Signal is obscured by noise or unwanted artifacts.
- **Solution:**
  - ❖ Minimize environmental electrical interference (e.g., nearby electronic devices or fluorescent lights).
  - ❖ Ensure proper grounding of the system.
  - ❖ Instruct the patient to minimize movements (e.g., blinking, jaw clenching).
  - ❖ Filter the signal to remove 50/60 Hz power line interference.

3. Calibration Errors

- **Problem:** The system fails to calibrate or provides inconsistent results.
- **Solution:**
  - ❖ Ensure the calibration signal generator is connected and functioning correctly.
  - ❖ Recalibrate the system, ensuring proper settings are applied.
  - ❖ Verify all signal paths for continuity.

EXAMPLE 1

Symptom: Machine runs, but the tracing on one or more channels is missing.

Possible Causes:

1. Ink reservoirs for pens are dry [on missing channel(s)].

2. Ink tubes are clogged.
3. Pen not touching.

Troubleshooting (machine off):

1. Check ink reservoirs.
2. Check ink tube for clogging.
3. Check for upwardly bent pens—gently push pen onto paper with finger or pencil to observe any tracing.

SOLUTIONS

1. For dry ink reservoirs, fill to level suggested by manufacturer (usually just below top rim). To overfill causes messy operation and can damage circuitry and mechanisms if allowed to drip into the machine.
2. For clogged ink tubes, remove the tube and pen and soak in warm water. Use a fine wire to gently push the clog through. Be certain not to punch a hole in the tube.
3. For bent pens, remove the pen in question and gently bend the pen downward. Be careful not to bend at right angles, as these pens are delicate and will crack.

EXAMPLE 2

Symptoms: **Spotty recordings (light/dark).**

Possible Causes: Worn pens or incorrectly loaded paper.

Troubleshooting:

Check paper loading, and if proper, then check pen for worn tip (ink not feeding properly).

SOLUTIONS

1. For paper loading, perform manufacturer's procedure.

2. For worn pen tip, replace with manufacturer's part or equivalent.

****