In the TJEMS area, acquiring 12-lead ECGs is a BLS skill. We do this because there’s a rapidly growing awareness that every health system is missing a lot of acute myocardial infarctions (MIs). This causes delays in treatment and increased patient mortality. For more info, see Procedures: “12-Lead ECG Acquisition Guidelines” at http://www.tjems.org/2017-guidelines/

Here’s what it looks like on the Philips MRx (The Heart Monitor) when it detects a possible MI:
The Problem:

The monitor is not as good as a trained person at identifying an >>>Acute MI<<<. The ECG taken needs to be as high quality as possible, and with all of the leads in the correct positions. Although the monitor is capable of telling if you’ve switched some of the leads around relative to each other, it is not capable of telling if the leads are in the wrong places. If the ECG is completely illegible, the monitor will default to calling it an >>>Acute MI<<<.

Patient Position:

The monitor wires are incredibly sensitive to movement. Slight tremors from the ambulance engine will degrade the quality of the ECG, and outright movement will ruin the picture entirely. It’s critical to position the patient and wires properly to minimize movement as much as possible.
Steps to taking an ECG:

1. Explain to patient what you’re doing and that you’re going to place electrodes on their chest.


3. **Shave, dry, and clean skin using skin prep pads.** *The monitor is so sensitive that the slightest bit of hair, moisture, or dirt will affect the legibility!* You will often see medics skip this step. This is because they’re better at reading ECGs than the monitor. **This is critical for BLS ECGs.**

4. Place electrodes. Limb leads on forearm and calves. Precordial leads (“V” leads) between ribs. Make sure the precordial leads are actually between the ribs, not on the stomach. Move breast tissue aggressively if needed.

5. Ask patient to stay still (This must be done before pressing “Start Acquire”).

6. Watch monitor screen until green lines are even and regular. See examples.

7. Press “Start Acquire” (Monitor starts taking picture at this point, **before** you put in the age and gender).

8. Continue holding still until monitor switches from “Acquiring ECG” to “Analyzing ECG”. Avoid touching the patient, moving the ambulance, slamming doors, etc. It’s that sensitive.

9. Check monitor for red bar warning. Save ECG printout.
Example of legible ECG. What you’re looking for is that the “complexes” in each lead look the same as each other. Don’t get used to the complexes looking a certain way, they can look wildly different from patient to patient.

V1 electrode missing. The dashed line indicates that a lead is not making a connection. Remember that “electrode” and “lead” are not the same thing. That’s why 10 electrodes create 12 leads.
Right arm electrode missing. Note that even though only one electrode is off, many leads are not showing. The leads don't necessarily correlate to the electrodes. When any lead is showing as a dashed line, you may need to check every electrode.

Common mistake. When V2 - V6 are missing, it's because the wires of the precordial leads haven’t been plugged into the connector.
Artifact caused by very slight movement such as the patient trembling, the leads being placed too much on the stomach, the ambulance vibrating, or too much tension on the wires. The monitor will not be able to read this ECG correctly, although a medic probably can.

Troubleshoot by:

1. Repositioning patient (<45 degrees, arms down by sides or in lap)
2. Repositioning wires
3. Moving electrodes off of stomach

“Wandering Baseline”: when the line between complexes is not straight. This type of artifact is almost always caused by the patient moving. Ask them to stop, or wait a little bit. The monitor will not be able to read this ECG correctly, although a medic might depending on how extreme the baseline movement is.