Procedure Guidelines

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<th>Protocol Title:</th>
<th>12 Lead ECG Application</th>
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<td>08/2000</td>
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<td>08/2000</td>
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<td>Date of Most Recent Update:</td>
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<td>Medical Director:</td>
<td>Chad Tortenson M.D.</td>
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Consider the use of 12-Lead ECG in the following list of possible patient presentations:
1. All chest pain including trauma to the chest also to include trauma caused by penetrating injury
2. Cardiac dysrhythmia, patient presents with cardiac signs or symptoms including but not limited to:
   - Heart rate greater the 150/min
   - Heart rate less than 50/min
   - Epigastric pain, unless evidence of G.I. bleed
   - Thoracic back pain without trauma
   - Diaphoresis not explained by environment or fever
   - Shortness of breath / dyspnea with clear lung sounds
   - Syncope or near syncope without seizure or obvious blood loss
   - Patient with PVC's unchanged by oxygen and/or greater than 6/min
   - CHF / Pulmonary edema
   - Tricyclic overdose
   - All overdoses

Treat patients with any of the following chief complaints as suspected AMI unless otherwise ordered:
- Chest pain or pressure in any patient > 25 years of age.
- Syncopal or near syncopal episode in any patient > 25 years of age.
- Unexplained shortness of breath.
- Atypical chest pain (i.e. shoulder, arm, or jaw pain) or other angina equivalents (dyspnea, diaphoresis, extreme fatigue, weakness, or pain at a site other than the chest occurring in patients at high cardiac risk).
Absence of chest pain, especially in patients having past cardiac history, irregular pulse, diabetes and in the elderly.
In young adults, consider history of cocaine and methamphetamine use

**Contra-indications:**
1. Treat life-threatening problems (i.e. A, B, C's, dysrhythmias) prior to obtaining a 12 lead ECG.
2. Obtaining a 12 lead ECG should not delay transport of critically ill patients.

**Preparation:**
1. Always, protect the modesty of the patient.
2. Lead placement area should be clear of items that may cause artifact (i.e. clothing, jewelry).
3. Skin should be clean and dry.
4. Shave chest hair as needed.

**12-Lead ECG Electrode Placements:**
The following describes the placement of all 10 electrodes and their order of placed:

**Limb Leads:**
RA- right arm, upper arm, or upper chest near the shoulder
LA- left arm, upper arm, or upper chest near the shoulder
RL- right leg or lower abdominal quadrant near the hip
LL- upper leg or lower abdominal quadrant near the hip

**Chest Leads (See diagram below):**
V1- 4th intercostal space, R sternal border
V2- 4th intercostal space, L sternal border
V4- 5th intercostal space in the midclavicular line
Note: place V4 prior to V3)
V3- Placed between V2 and V4.
V5- 5th intercostal space in the anterior axillary line
V6- 5th intercostal space in the mid axillary line

V4R for right sided ECG – Fifth intercostal space at right midclavicular line
V7 for posterior – posterior axillary line
V8 for posterior – midscapular
V9 for posterior - paraspinal
Find the anterior axillary line by making an imaginary line down from the fold formed where the arm meets the chest. The mid axillary line divides the body into anterior and posterior halves and is identified by dropping an imaginary line from the mid armpit down.

The correct placement of the precordial leads is dependent on the accuracy of finding the fourth intercostal space. Find this by identifying the sternal ridge (Angle of Lois). Find the upper third of the sternum, described as where the manubrium of the sternum meets the sternal body. The second rib joins the sternum at the level of the sternal ridge. Therefore, the space below the sternal ridge is the second intercostal space. Find the fourth intercostal space by using moderate finger pressure and counting down from this space.

It is important to remember that the 12 lead ECG is only a diagnostic tool, care providers should remember to treat the patient, not the monitor. It is possible to have a myocardial infarction in the presence of a normal ECG. Maintain a high index of suspicion, especially with diabetics and the elderly.

The 12 lead ECG should not be used as a means of clearing a patient of having a heart attack. It is imperative patients are informed that the means of AMI diagnosis in the pre-hospital setting are limited and further evaluation is needed by a physician.