



SAN ANTONIO REGIONAL HOSPITAL

Heart Center



Performing 12-Lead EKGs

Objectives

After completing this self-learning module the learner will:

- Understand basic anatomy and physiology related to performing 12-lead EKGs
- Identify the parts of the EKG Machine and their function
- State the data needed to properly identify the 12-lead EKG
- Demonstrate lead placement for performing a 12-lead EKG
- Demonstrate how to perform a 12-lead EKG
- Discuss how the EKG recording and data are saved
- Demonstrate techniques for improving EKG quality

After completion of this module the caregiver will arrange practical orientation with the cardiology department.

Introduction

Acute Coronary Syndrome (ACS) is an umbrella term that covers the spectrum of conditions where blood supplied to the heart muscle is suddenly blocked. Acute myocardial ischemia and/or infarction can occur due to the abrupt reduction in coronary blood flow. In patients with chest pain or other symptoms suggestive of ACS, a 12-lead EKG should be performed and evaluated for ischemic changes within 10 minutes of the patient's arrival at an emergency facility. In the Emergency Department (ED), STAT EKGs are performed by RNs, ERTs, and CTVs. This self-learning module is designed to help the learner understand the process for performing 12-lead EKGs.

EKG Anatomy & Physiology

The heart is located just to the left of the middle of the sternum extending from the 2nd intercostal space to the 6th intercostal space. Landmarks used to correctly place EKG electrodes include the clavicles, intercostal spaces and the axilla.

In order for the heart to contract, chemicals must pass through the membranes of cardiac cells. This movement causes very small electrical changes to occur that can be monitored by placing electrodes on the patient's skin. Where the electrodes are applied and the amount of conduction between the skin and electrodes affect the size and shape of the waves that are produced.

The EKG Machine

The EKG machine is a device that detects tiny amounts of electricity on the patient's skin. It is very sensitive. Moving the leads one inch on the patient's chest will change the size and shape of the waves on the EKG, which could alter the interpretation. So it is important to place the electrodes in the proper position when performing a 12-lead EKG.

Lead Placement

To perform a routine (Left-Sided) EKG, the leads should be placed in the following positions.

Lead	Location
Right and Left Arm Leads	Above the clavicles
Right and Left Leg Leads	Below the hips
V1	4 th ICS, Right Sternal Border
V2	4 th ICS, Left Sternal Border
V3	Between V2 and V4
V4	5 th ICS Left Midclavicular Line
V5	5 th ICS Left Anterior Axillary Line
V6	5 th ICS Left Midaxillary Line
Accessory Leads (used for pediatric patients)	
V4R	4 th ICS Right Midclavicular Line

Proper 12-Lead Placement for Left Side of Chest

- V₁ 4th intercostal space to the right of the sternum
- V₂ 4th intercostal space to the left of the sternum
- V₃ directly between the leads V₂ & V₄
- V₄ 5th intercostal space at midclavicular line
- V₅ level with V₄ at left anterior axillary line
- V₆ level with V₅ at left midaxillary line
(directly under the midpoint of the armpit)
- V_{4R} 5th intercostal space,
right midclavicular line

Proper 12-Lead Placement for Right Side of Chest

- V₁ 4th intercostal space to the left of the sternum
- V₂ 4th intercostal space to the right of the sternum
- V₃ directly between the leads V₂ & V₄
- V₄ 5th intercostal space at right midclavicular line
- V₅ level with V₄ at right anterior axillary line
- V₆ level with V₅ at right midaxillary line
(directly under the midpoint of the armpit)

- RA Right Arm
- LA Left Arm
- LL Left Leg
- RL Right Leg

Data Entry

The person performing the exam must enter the following required data:

1. Last name
2. First name
3. ID number (MRN #)
4. Date of birth (DOB)
5. Gender
6. Referring Provider
7. Technician (Employee #)
8. Location
9. Room #
10. MRN (enter again)
11. ACCT (FIN #)

Last name	_____
First name	_____
ID number	_____
Date of birth	_____/_____/_____
Gender	_____
Referred by	_____
Technician	_____
Location	_____
MRN	_____
Return	_____
Room	_____
ACCT	_____

All of this information is entered into the machine prior to recording the EKG. Once the test is completed the information will allow the EKG to be retrieved for future use.

Performing a 12-Lead EKG

Before performing the test, gather the supplies and equipment needed to perform the test. Ensure the EKG machine has paper loaded and disposable electrodes are stocked and accessible. Also, gather information (noted above) required to be entered into the machine.

Before entering the room, perform proper hand hygiene. When you enter the patient's room, identify yourself and explain the procedure to the patient. The patient should be supine and as relaxed as possible. Maintain a positive patient experience by providing patient privacy and keeping the patient comfortable and warm. Once the electrodes are placed in the correct locations on the patient and connected to the EKG machine, follow these steps:

1. Turn the machine on by pressing the "power button".
2. Press "F1" button (to start entering patient data) and press enter
3. Enter the patient's name (Last, First) and press enter
4. Use MR Number for patient ID press enter

5. Enter the patient's date of birth (day-month-year) and press enter
6. Enter Gender (M/F) press enter
7. Enter the referring physician's (ED MD's) name and press enter
8. Enter technician (your) initials or employee # and press enter
9. Enter location – ED is location #1 press enter
10. Enter Room and press enter
11. Enter MR number again and press enter
12. Enter the patient's Account Number
13. Select Return
14. Observe the tracing for a clear rhythm on the screen
15. Record EKG by pressing the “ECG button” the tracing will print after it has been accepted. →
16. Remove the tracing and disconnect the patient from the machine.
17. Remove all electrodes and dispose of them.
18. Assist the patient with their clothing / gown
19. Return machine to its storage spot and plug it in.
20. Present the EKG to the Emergency Physician to review (ED only).

