



ST SEGMENT MONITORING

Expected Practice:

- ☑ Use the lead that best defines the patient's "ST fingerprint" when monitoring for acute coronary occlusion and reocclusion of the vessel following therapeutic intervention.
- ☑ Use Leads III and V₃ for ST segment monitoring for patients with acute coronary artery syndrome. Use ST segment analysis to monitor patients:
 - In the early phase of acute coronary syndromes (ST elevation for non-ST elevation MI; unstable angina/"rule out" MI).
 - Who present to the emergency department with chest pain or anginal-equivalent symptoms.
 - Who have undergone non-urgent percutaneous coronary intervention with suboptimal angiographic results.
 - With possible variant angina due to coronary vasospasm.
- ☑ Mark electrode placement with indelible ink.
- ☑ Establish ST level with the patient in the supine position, set the ST alarm parameter 1-2 mm above and below the patient's baseline ST level and measure ST segment changes 60ms beyond the J point of the ECG complex.
- ☑ Properly prepare the patient's skin before attaching the ECG electrodes.

Supporting Evidence:

- Research demonstrates that monitoring for ST segment changes in 12 leads provides the most accurate data for identification of ischemic events. If 12 lead bedside monitoring is not available, multiples studies have shown that determining the patient's "ST fingerprint", defined as the pattern of ST-segment elevations and depressions that is unique to a particular patient based on the anatomic site of coronary occlusion, can be used to diagnose reocclusion of the affected vessel.¹⁻⁹
- Multiple studies show that if only 2 leads are available for ST segment monitoring, leads III and V₃ are recommended for patients with acute coronary syndromes, unless available information from previous 12-lead ECG obtained during an ischemic event indicates that another lead is more sensitive.^{1-2,4-14}
- Researchers have reported that as many as 80% to 90% of ECG detected ischemia events were clinically silent. In-hospital ischemic events are associated with worse patient outcomes including an in-hospital myocardial infarction or death. The groups of patients that benefit the most from continuous ST segment monitoring are patients with acute coronary syndromes presenting to the ED, patients undergoing a catheter-based procedure, patients with a cardiac history undergoing a surgical procedure and patient in the ICU following cardiac surgery as well as other procedures. Research is also beginning to show evidence that medical patients who are mechanically ventilated and are to undergo ventilator weaning may benefit as well.¹⁵⁻²¹
- Some studies show that variability of electrode placement occurs during routine ECG. Expert consensus recommends marking the locations of the electrodes with indelible ink to assure that if electrodes are removed for any reason (leads V₂ and V₃ are typically removed during recording of echocardiograms) they can be replaced in their original locations. ECG information obtained from electrodes located close to the heart (precordial leads) is especially prone to waveform changes when the electrodes are relocated as little as 1cm away from the original locations.^{1,22}
- Studies show that the patient must be in a supine position with the head of the bed no more than 30° to 45° when ST segment analysis is performed. When an ST alarm sounds and the patient is found in a side-lying position, the patient should be returned to the supine position. If the ST segment deviation persists in the supine state, it should be considered indicative of myocardial ischemia.^{1,2,15}
- Failure to properly prep the skin before placing the electrodes may cause the monitoring alarms to sound erroneously. Preparation may include shaving areas where electrodes are to be placed and/or cleaning the skin with alcohol to remove skin oils.^{1,2,16,23}

What You Should Do:

- When replacing current ECG monitoring equipment, consider equipment that has ST segment monitoring capabilities.
- Review organization policies and procedures related to cardiac monitoring to assure same standard of care across settings.
- Develop proficiency standards for all staff involved in the monitoring process to ensure patient safety and effective monitoring.
- Provide appropriate ECG education for staff.
 - Include didactic content and “hands-on” practice with return demonstration of lead placement
- Conduct an audit on determining appropriate leads to use for ST segment monitoring and appropriately setting ST alarm parameters.
- If compliance for either is <90%, develop a plan to improve compliance: Consider forming a multidisciplinary task force (nurses, physicians, respiratory therapist, monitor technician) or a unit core group of staff to address ECG monitoring practice changes.
 - Educate staff about the significance of correct placement of electrodes and skin preparation.
 - Incorporate content into orientation programs, initial and annual competency verifications.
 - Develop a variety of communication strategies to alert and remind staff of the importance ECG monitoring.

Need More Information or Help?

- Talk with a clinical practice specialist for additional information/assistance (www.aacn.org) then select PRN.

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