Hackensack Meridian Health clinical guidance for electrocardiographic rhythm monitoring in the hospital setting

May 17, 2021

Kristin Hayden, MSN, RN-BC, Jennifer Heck-Kanellidis, DNP, APN; Miriam Mcnicholas, DNP RN, CNL, NEA-BC, Elizabeth Maiorana, MSN, MBA, RN; Martha J. Radford, MD; Grant Simons, MD; on behalf of the cardiovascular clinical transformation service (CV CTS)

Continuous electrocardiographic rhythm monitoring, also known as telemetry, is frequently deployed as a monitoring modality for acute care inpatients. Telemetry use for certain patients can be life-saving. However, resources required to deploy telemetry are limited, and electrocardiographic rhythm monitoring is not universally available (nor is it indicated) for all acute-care inpatients. In addition, patient comfort may be compromised by the application of telemetry leads, patient mobility may be geographically limited, and patient experience may be adversely affected through noisy alarms. From the provider standpoint, over-use of telemetry may lead to alarm fatigue, counteracting the heightened attention to cardiac rhythm that telemetry aims to provide.

Initiation of telemetry requires a physician/LIP order, with documentation of indication and expected duration, and engenders responsibility for daily review and documentation of telemetry findings in the patient medical record as part of daily patient assessment by the responsible physician or licensed independent practitioner (LIP, either nurse practitioner or physician assistant). All telemetry indications, findings, and orders must be reviewed and re-ordered daily. If a telemetry is not re-ordered, telemetry should be discontinued 36 hours after the prior order. EHR-generated prompts to the physician/LIP who ordered telemetry will be sent at 24 hours and 30 hours after the order (12 and 6 hours prior to discontinuation).

Organizational options for telemetry monitoring

There are two general options for telemetry monitoring: unit-based and remote. Unit-based monitoring requires location of monitoring equipment and staff on the patient care unit. Remote monitoring is carried out at a central location off the patient care unit. Both unit-based and remote telemetry require that qualified staff are monitoring the heart rhythm and alarms, and that a defined, reliable process be in place for staff for notification when concerning rhythm/alarms are encountered. For details about how unit-based and remote telemetry monitoring are carried out, please see appendix B.

Telemetry during patient transport

Telemetry during transport requires that rhythm is monitored by an individual qualified to notify caregivers accompanying the patient immediately, when actionable rhythm disturbances occur, and that the patient is accompanied during the transport process by individuals qualified to respond to the actionable rhythm disturbance, specifically a physician, LIP, or ACLS-certified nurse. Thus, transport with telemetry is inherently resource-intensive from a clinical staffing perspective. The need to transport a patient (for example, to a different level of care, or for a test or procedure) is also an opportunity to review the current indication for telemetry, and to discontinue telemetry if an indication is no longer present. Similarly, since transporting telemetry patients is resource-intensive, the strength and urgency of the indication for the procedure requiring transport should be considered with respect to whether the procedure may be delayed until after telemetry is no longer indicated, or completed at the bedside. The physician/LIP should order discontinuation of telemetry if the relative risk to the patient is low, relative to the benefit of undergoing the procedure requiring transport.

Step-wise decision process for telemetry during transport:

- Is a telemetry indication present? If not, discontinue telemetry.
- Is discontinuation of telemetry for transport low-risk? If so, discontinue telemetry.
- Can the procedure requiring transport wait until after telemetry is completed, or performed at the beside? If so, delay procedure until after telemetry completed, or complete at bedside. If not, transport patient to/from procedure with telemetry and ACLS-trained personnel in attendance.

Appendix A. General guidance for duration of telemetry. Table below summarizes addresses indications for and duration of telemetry, operationalizing American Heart Association guidelines (1). Telemetry may be discontinued prior to indicated duration, at the discretion of the physician or LIP.

Condition	Begin telemetry	End telemetry
Malignant ventricular dysrhythmia, including frequent ICD discharges	Immediately	Duration of hospitalization
Out-of-hospital cardiopulmonary arrest	Immediately	72 hours
Structural trans-catheter structural interventions (TAVR, VSD or ASD closure, mitral valvuloplasty, etc.)	After procedure	72 hours
Initiation of medication that may be complicated by QT prolongation or ventricular pro-arhythmia (dofetilide, sotalol, other antiarrhythmic agents; some antibiotic, antimalarial, antifungal agents; antipsychotics, others)	Upon initiation	72 hours
Acute myocardial infarction, other acute coronary syndrome, acute myocarditis, acute stroke	Immediately	48 hours
Newly-diagnosed left main coronary artery disease (CAD)	Immediately	48 hours
Uncomplicated open heart surgery	After procedure	48 hours
Thoracic surgery	After procedure	48 hours
Coronary artery spasm; Takosubo's cardiomyopathy; other non-CAD ischemic syndrome	Immediately	48 hours
Infective endocarditis	Upon diagnosis	48 hours
Atrial tachyarrhythmia with hemodynamic instability, active treatment management	Immediately	48 hours
WPW, prolonged QT interval, other congenital syndrome with recurrent syncope	Immediately	48 hours
Symptomatic bradycardia	Immediately	48 hours
Hyper- or hypokalemia	Immediately	24 hours
Drug overdose	Immediately	24 hours
Syncope suspected to be cardiac	Immediately	24 hours
Acute decompensated heart failure	Immediately	24 hours
Elective PCI with complication	After procedure	24 hours
Elective cardiac electrophysiology procedure (ablation, pacemaker or ICD insertion)	After procedure	24 hours
After conscious sedation (per Aldrette score (3))	During sedation	24 hours

Continuous electrocardiographic rhythm monitoring (telemetry) is <u>not</u> indicated for patients with:

- Low-risk and non-cardiac chest pain
- Chronic atrial fibrillation, not requiring change in rate/rhythm management
- Stable heart failure

- Patients with implanted cardiac rhythm devices (pacemaker, ICD, etc.) without rhythm instability, admitted for unrelated conditions
- Occasional ectopic premature atrial or ventricular beats/contractions
- Asymptomatic low-risk postop patients, status post non-cardiac surgery
- Terminal illness, especially for patients whose advance directives indicate limitation in resuscitation measures and/or comfort care

Physician/LIP compliance with telemetry duration is assessed and monitored through retrospective electronic and manual review of the electronic health record, justifying actual duration against indication documented.

Appendix B. Nursing service procedure for telemetry monitoring

Application and removal of telemetry equipment

- All continuous cardiac monitored patients must maintain a patent intravenous access.
- Apply telemetry monitoring as per physician/LIP orders and HMH policy/procedure, and document application.
- Electrocardiograph monitoring electrodes are to be applied after skin preparation. Appropriate skin preparation includes:
  - Electrically clip chest hair in placement area
  - Wash placement area with soap and water
  - Dry area thoroughly-do NOT apply lotions/powder
  - Roughen placement area with a dry gauze
  - Electrodes should be changed according to manufacturer's instructions, and whenever needed to maintain signal conduction and avoid nuisance alarms (4).
  - Assess for alternate lead placement to facilitate monitoring of the patient when pacemaker, central wires, epicardial wires, or venous access devices are present.
- Electrodes/leads should be placed as follows:
  - Right arm lead- 2nd intercostal space mid-clavicular line
  - Left arm lead- 2nd intercostal space mid-clavicular line
  - Right leg lead- 8th intercostal space mid clavicular line-or directly beneath rib cage
  - Left leg lead-8th intercostal space mid clavicular line-or directly beneath rib cage
  - Chest 4th intercostal space right sternal border for V1 monitoring 4th intercostal space Left sternal border for V2 monitoring chest in 6 lead monitoring- 5th intercostal space, mid-axillary line
- For campuses with Phillips monitoring systems:
  - BLACK: Upper sternum
  - BROWN: Lower sternum at the level of 5th intercostal space WHITE: Patient's right mid-axillary line at the same level as the lower sternum electrode
  - RED: Patient's left mid-axillary line at the same level as the lower sternum electrode

- o GREEN: Patient's general lower right quadrant (placement is not critical for this electrode.)
- To prevent the loss of signal the ground lead (main transducer lead) should be looped and taped. For GE/Phillips and Drager this is the green/or right leg lead.
- Once time for telemetry discontinuation has passed, remove telemetry leads and electrodes from patient's skin, and document removal.
- Consult manufacturer's instructions for specific cleaning and disinfecting of telemetry monitors/leads/wires.

Rhythm monitoring, documentation, and communication

- Only a telemetry competent nurse or monitor technician can be responsible for the observation of the cardiac monitors.
- The non-telemetry certified RN caring for the continuously cardiac monitored patient will refer rhythm interpretation and ongoing cardiac monitoring of the cardiac rhythm to the telemetry certified RN/MT.
- Distractions at the cardiac monitors are to be kept at a minimum.
- Rhythm is to be reviewed by telemetry certified RN or monitor technician (MT), including the following: atrial and/or ventricular rate, PR interval, QRS, QT interval and interpretation. Pacemaker rhythm interpretation includes chamber(s) sensed, paced, and captured.
- Documentation of the cardiac rhythm will be completed at scheduled intervals: within 30 minutes of admission to telemetry, and every four hours. Rhythm strips are printed and/or electronically placed on the telemetry mount sheets or placed directly in the patients' chart daily.
- Documentation of the cardiac rhythm will be completed at scheduled intervals: within 30 minutes of admission to telemetry, and every four hours. Rhythm strips are printed and/or electronically placed on the telemetry mount sheets or placed directly in the patients' chart daily.
- The following is to be verified each shift and documented in the EMR: telemetry transmitter number, correct patient and correct room number.
- All rhythm and/or rate changes and treatments/interventions are to be documented in the EMR by the RN as well as any/all drug infusions to treat dysrhythmia that are in use. Cardiac rate, rhythm, and any changes are to be clearly communicated in change of shift report and/or anytime care of the patient is transferred utilizing the IPASS format: HMH hand-off communication.
- Documentation requirements for specific monitor types is available in attachments (attachments to branded instructions to be added in PolicyStat).

Response to cardiac rhythm abnormalities

- With any change in rate or rhythm, there is to be immediate notification of the change to the primary RN by the telemetry certified RN/MT, with a rhythm strip and is to be printed and placed on telemetry mount sheet or patient's medical record. Review of the change by the telemetry-certified RN/MT should include: atrial and/or ventricular rate, PR interval, QRS, QT interval, interpretation and pacemaker malfunction. See telemetry nurse and monitor technician education (URL).
- In response to a cardiac rhythm requiring immediate attention, a telemetry-certified RN may independently initiate current American Heart Association (AHA) Advanced Cardiac Life Support (ACLS) or Basic Life Support (BLS) guidelines based upon their certification. As soon as possible following the initiation of ACLS or BLS, the RN, or his/her designee will call for an HMH adult cardiopulmonary arrest or rapid response and/or notify the licensed provider or his/her designee of the events, the patient's current condition, and obtain further medical orders (5).

- Lethal-life threatening arrhythmias are to be addressed immediately and with urgency. The primary RN is notified immediately. Algorithm (attachments to be added in PolicyStat) is followed.

Procedures specific to centralized/remote telemetry monitoring

- A completed telemetry data sheet needs to be provided to the monitor technician on admission. The telemetry data sheet must have:
    - The ordering provider name.
    - The indication for telemetry monitoring.
    - Indication of the presence of an automatic internal cardiac defibrillator (AICD).
    - Indication of the presence of a pacemaker.
    - Completion of the information blocks which includes the patient's assigned room-bed number.
    - Patient identification label
- Emergency phone procedure/central/remote telemetry alarm alert protocol (attachments to be added in PolicyStat):
    - Life threatening alarms: call red phone and/or activate alarm/emergency response system
    - Non-life-threatening alarms: call nursing unit or RN spectra link if provided
        - Call red phone if no answer within 3 minutes
    - No picture or no response from staff: call red phone
    - Please submit an event report via ONElink for any red phone calls not answered within 1 minute

Procedures specific to unit-based telemetry monitoring

- Alarm settings including heart rate minimum and maximum, arrhythmias, and PVC count should be set individually with regards to patient condition and diagnosis; and documented in the medical record. Initially the patient will be placed on the units standardized alarm limits that are found in the scope of service for that unit.
- Alarms signals may be changed, disabled, or suspended when there is a recognized code or rapid response in progress and the patient is placed on a portable monitor, or the patient is transported off the unit.
- The telemetry certified RN may individualize heart rate alarm limits based on the patient status and clinical judgement. Alarms should be individualized to prevent alarm fatigue. Any other alarm settings require an order from a licensed independent practitioner to be changed.
- Arrhythmia parameters and alarm settings may be changed when there is a recognized change in the patient's rhythm/status with or without intervention, i.e. DNR/ambulation trial, antiarrhythmic medication administration. Arrhythmia parameters and parameter changes require an order from an LIP.
- The monitor technician can change, disable, or suspend telemetry alarms under the direction of the registered nurse or LIP.
- Alarms should be responded to in accordance with the telemetry alarm algorithms (see attachments for each HMH organization, if applicable)

- Proper operation, detectability, and accuracy of the settings will be validated through the presence of the printed rhythm strip and mounted on the chart.
- The medical record should reflect any and all alarm individualization and alarm settings for each patient.
- Alarm settings are assessed each shift and documented in the EMR and the monitor log (if applicable).

Appendix C. Responsibilities of other HMH team members

Biomedical engineering

- Have in place a preventative maintenance program to ensure safety, efficiency, and effectiveness.
- Establish a baseline inventory assessment of the hospital telemetry monitors with annual re-assessment.
- Consult with the clinical alarms committee and unit managers to determine alarm default settings (6).

Physician/licensed independent practitioner

- Evaluation and documentation of telemetry indications upon admission and transfer, and with changes in clinical status.
- Daily assessment and documentation of telemetry rhythm, rate, and alarms for the previous day.
- Daily order for telemetry, including patient indication for telemetry.
- Responsibility for need for telemetry during transport lies with the physician/LIP ordering telemetry. Please see above.

Appendix D. References

1. Update to practice standards for electrocardiographic monitoring in hospital settings: a scientific statement from the American Heart Association. Sandau KE et al, *Circulation* (2017) 136: e273–e344; https://www.ahajournals.org/doi/10.1161/CIR.0000000000000527.
2. Assessment of a targeted electronic health record intervention to reduce telemetry duration, a cluster-randomized clinical trial. Najafi N et al, *JAMA Int Med* (2019) 179:11-15, jamanetwork.com/journals/jamainternalmedicine/fullarticle/2717954.
3. Aldrette score: https://www.mdapp.co/aldrete-score-calculator-147/.
4. American Association of Critical-care Nurses: Practice Alert: Alarm Safety http://www.aacn.org/dm/practice/actionpakdetail.aspx?itemid=28337
5. HMH Medical Alert Adult Code; HMH-Medical Alert Rapid Response
6. URL for network alarms policy to be added when completed