Cardiac Monitoring

Site Applicability

PHC: SPH and MSJ.

Practice Level

Specialized:
Registered Nurses who have completed a recognized cardiac monitoring course or equivalent and who successfully complete a written exam.

Nurses must possess competency in identifying the rhythms listed in Appendix B and instituting appropriate interventions, Additional competencies may be required in specific units (e.g. ST monitoring in CICU, CSICU, CSSU)

Review of each nurse's competence in rhythm recognition is completed every 2 years

Need to Know

Cardiac monitoring allows continuous monitoring of the heart's electrical activity to detect abnormalities in conduction (arrhythmias) or evidence of ischemia (critical care areas only), to assess effect of arrhythmias or ischemia on hemodynamic status, and monitor effectiveness of anti-arrhythmic medications.

Cardiac monitoring can be done using direct attachment to a bedside monitor ("hard-wire" monitoring) or wireless transmission of signals to a receiver/monitor (telemetry).

Although hard-wire cardiac monitoring usually produces a more stable and clearer ECG tracing than telemetry, it limits patients' ability to ambulate. Careful skin preparation and electrode placement can minimize ECG waveform distortion during telemetry monitoring.

Any patient that is transported out of a critical care unit must remain on ECG monitoring using a portable monitor, unless there is a specific physician's order stating otherwise. For patients on telemetry, the physician must indicate whether monitoring may be discontinued during transport.

Information Specific to Telemetry Monitoring

Telemetry is initiated with a physician or nurse practitioner's order. The orders should include the following:

1. Reason for telemetry
2. Categorization of monitoring requirements into one of the following:
    a) Class I – Patient to be monitored at all times, including transport off unit
    b) Class II – Telemetry may be suspended for transport off unit.
3. Duration of telemetry. Nurses can independently discontinue telemetry once duration parameter met in the order. (e.g. if duration is 48h, the nurse may discontinue the telemetry at

the 48h mark if no arrhythmia. The nurse should discuss the order with a physician if there is any doubt on whether the patient has been arrhythmia free.

Telemetry can be initiated without an order in the following circumstances:

1. Deteriorating hemodynamic status (decreased LOC, decreased BP, respiratory distress and/or angina **with** suspected arrhythmia,
    a) Chest pain or other signs of ischemia **without** evidence of change in rhythm (e.g. a significant increase or decrease in heart rate) does not necessarily warrant initiation of telemetry. Refer to Chest Pain (Outside Critical Care) protocol and Myocardial Ischemia Management protocol for appropriate nursing interventions.
2. Unexplained low flow +/- persistent low PIs on VAD parameters

All RN initiated telemetry must be communicated to the most responsible provider and an order should be obtained when it is safe and feasible to do so.

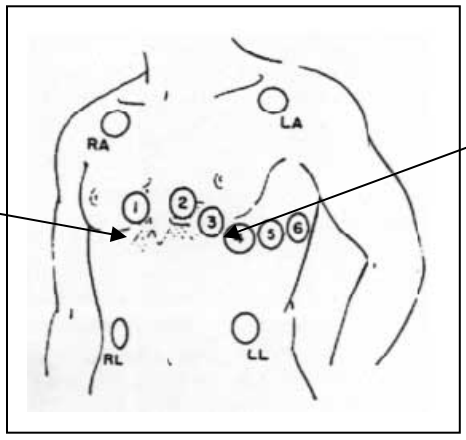
All patients on telemetry require patent intravenous access.

Protocol

Initiating Cardiac Monitoring

1. Prepare skin by cleansing the area and wiping with a dry washcloth. Do not use alcohol to clean the site. Clip excessive hair if present. Only use sites where there is adequate skin integrity
2. Position electrodes*:
    a. Right Arm (White) - just below the right clavicle
    b. Left Arm (Black) - just below the left clavicle
    c. Right Leg (Green) - on the right lower chest, level of lowest rib on the thorax or on the hip
    d. Left Leg (Red) - on the left lower chest, level of lowest rib on the thorax or on the hip
    e. V_3** (Brown) - halfway between V_2 and V_4, see diagram. See B-00-12-10018 for more information.

All units: V_1 recommended precordial lead in pts with *arrhythmia-related diagnosis* or post-cardiac surgery (after leaving CSICU)



Critical care units: V_3 recommended precordial lead in pts with *primary diagnosis of, or at significant risk for ischemia*; this placement is also suggested for such patients on 5A and 5B

- *Cath lab and CSICU may use a different electrode placement due to procedure requirements, or sternal incision and chest drains.

3. Admit the patient to cardiac monitoring system as per manufacturer's instructions.
4. Use the following guidelines when admitting to the monitoring system on 5AB:
    - **Patient Identifiers:**
        - Enter patient last name. Add a first initial if there are similar or identical surnames on the unit.
            - To disguise a patient's name (i.e. the patient does not want their surname visible on the screen or patient is classified 'do not disclose'), enter "Patient A" as an alias in the 'Name' field. When disguising more than one name, use "Patient B", "Patient C", etc.
        - **Enter patient MRN**. This number is correlated later in medical records and must be accurate.
    - If patient has orders for class one telemetry, use the "group" button to select class one
    - If patient has a pacemaker, turn pace mode to ON

Battery charging for 5AB telemetry system

When patients are on telemetry, the telemetry pack's battery needs to be changed at the beginning of each shift (07 & 1900). Depleted batteries need to be placed on the charging station to be recharged.

Initial Assessment:

1. Analyze rhythm by measuring the following:
    a. Rate (atrial and ventricular)
    b. Regularity
    c. PR interval
    d. QRS duration
2. Identify rhythm
3. Customize alarm settings to patient condition to minimize non-actionable alarms

Note: If a rate or interval is not measurable, indicate this by writing "n/a" in the applicable space. Do not leave any spaces blank.

Ongoing Assessment

1. Verify correct electrode placement with each patient assessment
2. For all alarms assess patient first for response to arrhythmia (Level of consciousness, vital signs, presence of symptoms including: Shortness of breath, chest pain), artifact, loose/missing electrode(s)
3. Analyze rhythm strip at the beginning of shift and with any change in rhythm

4. Assess vital signs as per unit protocol and PRN while on cardiac monitor
5. Assess skin for irritation under electrodes during the first 24 hours. Electrodes are replaced every 24 to 48 hours hours at 0700, (beginning of day shift) or as needed.

Interventions:

1. Call **CODE BLUE** for any sudden extreme deterioration in condition (e.g., decreased level of consciousness, respiratory distress, symptomatic decreased BP)
2. Call CODE BLUE and follow code blue protocol for defibrillation of VF or pulseless ventricular tachycardia
3. Set/review heart rate limits appropriate to patient's clinical condition and rhythm at the beginning of the shift and PRN
4. Notify MD of any unexpected change in rhythm
5. If patient unstable call for assistance and **NOTIFY MD IMMEDIATELY**; provide supportive care; intervene as per protocol for Bradycardia (Cardiac Wards), or Temporary Epicardial Pacing
6. Nurses may independently discontinue cardiac monitoring after the duration for monitoring is met and without a change from patient's baseline rhythm for Class II patients only. A specific order is required for all other patients.
7. See Appendix A for additional cardiac monitoring troubleshooting

Documentation

1. ECG Rhythm Strip Flow Sheet - mount ECG rhythm strip every shift and with any change in rhythm. Document the lead analysed, rhythm analysis and interpretation on the paper flowsheet.
2. Document rhythm interpretation only in electronic health record (analysis is on paper only).
3. Record assessments, nursing interventions and patient's response on the Electronic Health Record

Patient and Family Education

- Explain the purpose of monitoring
- Inform patients on 5AB that their surname will be visible to the public on the nursing station and hallway monitors. If patient does not want their surname on the monitor, disguise patient's name using the instructions described above in the Practice Guideline.
- Review activity allowed
- Reassure patient that the monitor is being observed even when the nurse is not with the patient
- Inform patient that monitor will not work if patient leaves the unit.
- Inform patient that the telemetry pack must be removed before leaving the unit.
- Explain importance of reporting to nurse feelings of chest discomfort, rapid heartbeat, nausea, dizziness, sweatiness or shortness of breath

Related Documents

1. B-00-12-10018 - ST Segment Monitoring: Initiating
2. B-00-07-10060 - Cardiac Arrest (Code Blue) Initiating (SPH and MSJ)
3. B-00-13-10014 - Bradycardia (Cardiac Wards)
4. B-00-13-10017 – Physical Assessment (Critical Care Areas)
5. B-00-13-10096 – Physical Assessment (Cardiac Ward)
6. B-00-13-10021 – Myocardial Ischemia; Management of in CICU
7. B-00-13-10032 – Chest Pain (Outside Critical Care) Care of patient
8. B-00-13-10034 – Vasoactive Agents (Infusion) on Cardiology Ward (5A) Administration
9. B-00-13-10083 - Epicardial Pacing and Pacing Wire Care on Cardiac Wards, protocol
10. Philips MX40 Instructions for Use (found on units 5AB)

References

1. Sandau, K. E., Funk, M., Auerbach, A., Barsness, G. W., Blum, K., Cvach, M., Lampert, R., May, J. L., McDaniel, G. M., Perez, M. V., Sendelbach, S., Sommargren, C. E., & Wang, P. J. (2017). Update to Practice Standards for Electrocardiographic Monitoring in Hospital Settings: A Scientific Statement From the American Heart Association. *Circulation*, 136(19), e273–e344. https://doi.org/10.1161/CIR.0000000000000527
2. Evenson, L., Farnsworth, M. (2010). Skilled cardiac monitoring at the bedside: An algorithm for success. *Critical Care Nurse, 30* (5)*,* 14-22..
3. Webner, C. (2011). Applying evidence at the bedside. *Dimensions of Critical Care Nursing, 30* (1), 8-18.

Appendix A Trouble Shooting Cardiac Monitors

Problem	Possible Cause	Solution
False high heart rate alarm	▪ Monitor interprets peaked T waves as QRS complexes, double counting ▪ Skeletal muscle activity	▪ Reposition electrodes ▪ Place electrodes away from major muscle masses
False low heart rate alarm	▪ Shift in electrical axis from patient movement, making QRS complexes too small to register ▪ Low amplitude QRS ▪ Poor contact between electrode and skin	▪ Reapply electrodes ▪ Set size or gain control so height of complex is greater than 1 millivolt ▪ In the ECG Analysis window, select change QRS detection. Select “low” for a patient with low voltage QRS
Low amplitude or no waveform	▪ Deteriorating patient ▪ Size or gain control dial set too low ▪ Poor contact between skin and electrode; dried gel, broken or loose lead wires, poor connection between patient and monitor, malfunctioning monitor, physiological loss of QRS amplitude	▪ Check patient, initiate code blue if in asystole. ▪ Increase size or gain control ▪ In the ECG Analysis window, select change QRS detection. Select “low” for a patient with low voltage QRS ▪ Check connections on all lead wires and monitoring cable. ▪ Reapply electrodes if required ▪ Check battery and replace if necessary
Wandering baseline	▪ Poor position or contact between electrodes and skin ▪ Thoracic movement	▪ Reposition or replace electrodes ▪ Reposition electrodes
Artifact (waveform interference)	▪ Patient experiencing seizures, chills or anxiety ▪ Patient movement ▪ Electrodes applied improperly ▪ Static electricity ▪ Electrical short circuit in lead wires or cable	▪ Notify doctor and treat patient as ordered. Keep patient warm and reassure ▪ Help patient relax ▪ Check electrode placement & readjust as necessary ▪ Make sure cables do not have exposed connectors. Change static causing bedclothes ▪ Unplug bed or IV pumps. ▪ Replace broke equipment. Send any broken equipment to Biomed department
Broken lead wire	▪ Lead wires and cables cleaned with alcohol or acetone cause brittleness	▪ Replace wires, send broken wires to Biomed department
Skin excoriation under electrode	▪ Patient allergic to electrode ▪ Electrode left on skin too long	▪ Remove electrode, clean off any excess gel, replace electrode with non-allergenic/ pediatric electrode ▪ Remove electrode, clean site and reapply electrode at a new site

Appendix B Specific ECG Abnormalities Which Nurses Must Be Competent in Recognizing

Normal rhythms

- Sinus rhythm
- Sinus bradycardia
- Sinus arrhythmia
- Sinus tachycardia

Intraventricular conduction defects

- Bundle-branch block
- Aberrant ventricular conduction

Bradyarrhythmias

- Inappropriate sinus bradycardia
- Sinus node pause or arrest
- Nonconducted atrial premature beats
- Junctional rhythm

AV blocks

- 1st degree
- 2nd degree
    - Mobitz I (Wenckebach)
    - Mobitz II
    - Advanced (greater than 2:1)
- 3rd degree (complete AV block)
- Asystole, pulseless electrical activity

Tachyarrhythmias

- Supraventricular
    - Paroxysmal supraventricular tachycardia
    - Atrial fibrillation
    - Atrial flutter
    - Multifocal atrial tachycardia
    - Atrial tachycardia
    - Accelerated junctional rhythm

Ventricular

- Accelerated ventricular rhythm
- Nonsustained/sustained monomorphic ventricular tachycardia
- Nonsustained/sustained polymorphic ventricular tachycardia
- Prolonged QT interval-associated ventricular ectopy, torsades de pointes
- Ventricular fibrillation

Premature complexes

- Supraventricular (atrial, junctional)
- Ventricular

Pacemaker electrocardiography

- Failure to capture
- Failure to pace (no pacer output)
- Failure to sense

ECG abnormalities of acute myocardial ischemia

- ST-segment elevation, depression
- T-wave inversion

Other

Muscle or other artifact simulating arrhythmias

Persons/Groups Consulted:

Clinical Nurse Leader, 5A Cardiology

Nurse Educator, 5CD

Nurse Educator, CICU

Nurse Educator, CSICU

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Approved/Reviewed/Revised:

Approved: July 1994

Revised: July 1995

May 2006

August 2007

July 2012

February 2014

First Released Date:	JULY 1994
Posted Date:	03-MAR-2022
Last Revised:	03-MAR-2022
Last Reviewed:	03-MAR-2022
Approved By:	PHC
	Professional Practice Standards Committee
Owners:	PHC
	Heart Centre