

cardiac monitoring nursing tips

The Art of Cardiac Monitoring: Essential Nursing Tips for Accuracy and Patient Safety

cardiac monitoring nursing tips are paramount for delivering high-quality patient care, especially for individuals at risk of or experiencing cardiovascular compromise. Accurate interpretation and vigilant observation of cardiac rhythms are crucial for early detection of life-threatening arrhythmias, timely intervention, and ultimately, improved patient outcomes. This comprehensive guide delves into the core principles and practical strategies that nurses must employ to excel in cardiac monitoring, covering everything from lead placement and artifact recognition to understanding complex arrhythmias and communicating effectively with the healthcare team. Mastering these techniques ensures that nurses are well-equipped to provide safe and effective care in a variety of clinical settings, from the intensive care unit to step-down units and beyond.

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Understanding the Basics of Cardiac Monitoring

Cardiac monitoring, at its core, involves the continuous observation of a patient's electrocardiogram (ECG) to detect any deviations from normal electrical activity of the heart. This process is vital in identifying potential cardiac events, such as ischemia, infarction, or significant arrhythmias, which can lead to hemodynamic instability. Nurses play a pivotal role as the frontline observers, responsible for not only applying the monitoring equipment but also for interpreting the data and initiating appropriate interventions based on established protocols. Effective cardiac monitoring nursing tips begin with a solid understanding of cardiac anatomy and physiology, as well as the electrical conduction system of the heart.

The electrical impulse originates in the sinoatrial (SA) node, travels through the atria, to the atrioventricular (AV) node, down the bundle of His, and through the Purkinje fibers to the ventricles, causing them to contract. Each of these phases of depolarization and repolarization is represented on the ECG tracing as specific waveforms – the P wave, QRS complex, and T wave.

Understanding the normal duration, amplitude, and morphology of these components is essential for identifying abnormalities. Furthermore, nurses must be familiar with the concepts of heart rate calculation, rhythm analysis, and the assessment of intervals such as the PR interval and QT interval, all of which provide critical insights into cardiac function.

Lead Placement: The Foundation of Accurate Data

The accuracy of any cardiac monitoring system hinges on correct lead placement. Improperly placed leads can lead to distorted waveforms, misinterpretation of rhythms, and potentially missed critical events. This makes meticulous lead placement one of the most fundamental cardiac monitoring nursing tips. A standard 12-lead ECG, while often used for diagnostic purposes, is typically not employed for continuous bedside monitoring. Instead, a modified 3-lead or 5-lead system is commonly utilized. The goal is to obtain a clear view of the heart's electrical activity, allowing for the identification of key waveforms and rhythm characteristics.

Standard Lead Placement for 3-Lead Monitoring

For a 3-lead monitoring system, the standard placement involves three electrodes: a right arm (RA) lead, a left arm (LA) lead, and a left leg (LL) lead. The right leg (RL) lead typically serves as a ground. The RA lead is placed on the upper right torso, the LA lead on the upper left torso, and the LL lead on the lower left torso. This configuration typically provides a view that is similar to lead II of a 12-lead ECG, which is excellent for visualizing atrial activity and the overall rhythm. Nurses must ensure that the skin is clean and dry before applying the electrodes to promote good adhesion and electrical conductivity.

Standard Lead Placement for 5-Lead Monitoring

A 5-lead monitoring system offers a more comprehensive view and is often preferred in critical care settings. In addition to the RA, LA, and LL leads, a V1 (or MCL1) lead is added, usually placed in the fourth intercostal space, right sternal border. The RL lead remains the ground. The V1 lead provides a view of the electrical activity that is similar to the V1 lead in a 12-lead ECG, which is particularly useful for identifying ventricular rhythms, such as bundle branch blocks, and assessing the ST segment for ischemia. Proper placement of the V1 lead is critical for its diagnostic value.

Tips for Optimal Electrode Adhesion and Skin Integrity

Maintaining good adhesion is crucial for preventing artifacts. Nurses should always:

- Cleanse the skin with soap and water or an alcohol wipe and allow it to dry completely.
- Avoid placing electrodes over bony prominences, scar tissue, or areas of excessive hair. If hair is present, it may need to be gently clipped, not shaved, to avoid skin irritation.
- Use high-quality, hypoallergenic electrodes designed for cardiac monitoring.
- Regularly check the electrodes for signs of dislodgement, peeling edges, or skin irritation, especially in patients with diaphoresis or significant body hair.
- Change electrodes as per facility policy, typically every 24-48 hours, or sooner if adhesion is compromised or skin irritation develops.

Artifact Recognition and Troubleshooting

Artifacts are unwanted electrical signals that can mimic or obscure true cardiac activity, posing a significant challenge in cardiac monitoring. Recognizing and effectively troubleshooting these disturbances is a core competency for nurses, directly impacting the reliability of the monitoring data. Understanding the common sources of artifact is the first step in applying effective cardiac monitoring nursing tips.

Patient movement is a frequent culprit, causing erratic baseline fluctuations. Muscle tremors, shivering, or even talking can generate electrical interference. Electrical interference from equipment, loose lead connections, or even static electricity can also create confusing patterns. Furthermore, physiological factors like patient perspiration can lead to poor electrode contact and subsequent artifact. The key is to differentiate between true cardiac events and false alarms caused by these external or internal interferences.

Common Types of Artifact and Their Appearance

- **Somatic Tremor:** Appears as a fuzzy, irregular baseline, often seen with patient movement, tremors, or shivering.
- **60-Cycle (Wander) Interference:** Characterized by thick, coarse, and irregular oscillations, usually caused by electrical interference from nearby equipment or faulty grounding.
- **Broken Lead Wire/Loose Electrode:** Can result in a flat line, intermittent signals, or erratic spikes, depending on the nature of the disconnection.
- **Baseline Wander:** A slow, undulating baseline that can obscure P waves and QRS complexes, often due to poor electrode contact or patient perspiration.

Strategies for Artifact Reduction

When faced with artifact, nurses should systematically investigate potential causes. First, assess the patient for any obvious signs of movement or discomfort. Gently reassuring the patient and asking them to remain still can often resolve somatic tremor. Next, inspect all lead connections and the integrity of the electrodes. If a loose electrode is suspected, reapply it firmly after cleaning the skin. For suspected electrical interference, try turning off nearby equipment one by one to identify the source. If baseline wander is the issue, check electrode adhesion and skin preparation. In some cases, changing the lead selection on the monitor can help filter out certain types of artifact.

Interpreting Basic ECG Rhythms

The ability to accurately interpret basic ECG rhythms is fundamental to effective cardiac monitoring nursing. Nurses must go beyond simply observing the tracing; they need to analyze it systematically to identify normal sinus rhythm and common deviations. This interpretive skill is a cornerstone of cardiac monitoring nursing tips.

A systematic approach to rhythm interpretation, often remembered by the acronym "RAVEN" or "DR. PQRS," ensures that all critical components are assessed. For continuous monitoring, the focus is typically on identifying the underlying rhythm, assessing the rate, and looking for any potentially

life-threatening abnormalities. Understanding the characteristics of each component of the ECG complex – the P wave, PR interval, QRS complex, and T wave – allows for a more precise diagnosis of the rhythm.

Systematic Approach to Rhythm Analysis

A common and effective method for rhythm analysis involves several key steps:

1. **Rate:** Determine the heart rate. For regular rhythms, count the number of large boxes between two consecutive R waves and divide 300 by that number. For irregular rhythms, count the number of QRS complexes in a 6-second strip and multiply by 10.
2. **Rhythm:** Assess the regularity of the R-R intervals. If the intervals are consistent, the rhythm is regular; if they vary significantly, it is irregular.
3. **P Waves:** Look for the presence, shape, and relationship of P waves to the QRS complexes. In normal sinus rhythm, there should be one P wave before every QRS complex, and they should have a consistent morphology.
4. **PR Interval:** Measure the duration of the PR interval (from the beginning of the P wave to the beginning of the QRS complex). A normal PR interval is typically 0.12-0.20 seconds.
5. **QRS Complex:** Measure the duration of the QRS complex (from the beginning of the QRS to its end). A normal QRS duration is typically 0.06-0.10 seconds.
6. **ST Segment:** Assess the ST segment for elevation or depression, which can indicate myocardial ischemia or injury.
7. **T Waves:** Evaluate the morphology of the T waves, looking for abnormalities like inversion or peaking, which can also be indicative of cardiac issues.

Normal Sinus Rhythm (NSR)

Normal Sinus Rhythm is the baseline rhythm originating from the SA node. Its defining characteristics include:

- Heart rate between 60 and 100 beats per minute.
- Regular R-R intervals.

- One P wave preceding every QRS complex.
- Consistent P wave morphology.
- A PR interval between 0.12 and 0.20 seconds.
- A QRS complex duration between 0.06 and 0.10 seconds.
- Upright T waves.

Nurses should be able to quickly identify NSR and use it as a benchmark for comparison when other rhythms are present. Recognizing the absence of NSR promptly triggers further investigation.

Recognizing and Responding to Common Arrhythmias

Beyond normal sinus rhythm, nurses must be adept at recognizing and responding to a spectrum of common arrhythmias. Early identification and appropriate intervention can prevent serious complications such as stroke, heart failure, or sudden cardiac arrest. This competency forms a crucial part of practical cardiac monitoring nursing tips.

Each arrhythmia has distinct ECG characteristics that nurses need to identify. Furthermore, understanding the hemodynamic implications of these rhythms and the immediate nursing actions required is paramount. This involves not only interpreting the tracing but also assessing the patient's clinical presentation and collaborating with the healthcare team.

Sinus Bradycardia and Tachycardia

Sinus Bradycardia is defined as a sinus rhythm with a heart rate below 60 beats per minute. While often asymptomatic, it can become problematic if the heart rate is too slow to maintain adequate cardiac output. Causes include certain medications (e.g., beta-blockers, calcium channel blockers), increased vagal tone, or intrinsic cardiac disease. Nursing considerations include assessing for symptoms of poor perfusion (dizziness, syncope, chest pain) and notifying the physician if the patient is symptomatic or if the rate is critically low. Treatment may involve identifying and correcting the underlying cause or administering medications like atropine.

Sinus Tachycardia is a sinus rhythm with a heart rate above 100 beats per minute. It is a physiological response to various stimuli such as fever, hypovolemia, pain, anxiety, or certain medications. While often benign, persistent tachycardia can lead to increased myocardial oxygen demand and

decreased diastolic filling time, potentially exacerbating underlying cardiac conditions. Nursing interventions focus on identifying and treating the underlying cause. For instance, if the patient is febrile, antipyretics would be administered; if they are in pain, analgesics would be given.

Atrial Fibrillation (AFib) and Atrial Flutter

Atrial Fibrillation (AFib) is characterized by chaotic electrical activity in the atria, resulting in an irregularly irregular ventricular response and the absence of discernible P waves, replaced by fibrillatory waves. This can significantly increase the risk of thromboembolic events due to blood pooling in the atria. Nursing responsibilities include monitoring the ventricular rate, assessing for signs of stroke (neurological deficits), and administering anticoagulants as prescribed. Rate control medications (e.g., beta-blockers, calcium channel blockers) are often used to manage the ventricular rate.

Atrial Flutter typically presents with a characteristic "sawtooth" pattern of flutter waves, often with a consistent flutter wave to QRS complex ratio (e.g., 2:1, 3:1, 4:1), leading to a regular or irregularly irregular ventricular response. Similar to AFib, it can lead to reduced cardiac output and increased risk of embolism. Nursing care involves rate control, monitoring for embolization, and administering prescribed medications. Cardioversion may be considered if the patient is hemodynamically unstable.

Ventricular Tachycardia (VT) and Ventricular Fibrillation (VF)

Ventricular Tachycardia (VT) is a rapid heart rhythm originating from the ventricles, characterized by wide QRS complexes (typically >0.12 seconds) at a rate of 100-250 beats per minute. It can be monomorphic (uniform complexes) or polymorphic (varying complex shapes). VT can compromise cardiac output significantly and may degenerate into ventricular fibrillation. Nurses must immediately assess the patient's hemodynamic stability. If the patient is pulseless, immediate CPR and defibrillation are indicated. If the patient is stable or has a pulse, specific medications like amiodarone or lidocaine may be administered, and the physician will be notified for further management, which may include synchronized cardioversion or an electrophysiology study.

Ventricular Fibrillation (VF) is a chaotic, disorganized electrical activity in the ventricles, characterized by irregular, wavy lines of varying amplitude on the ECG, with no discernible P waves, QRS complexes, or T waves. It is a life-threatening arrhythmia that results in no cardiac output and is the most common cause of sudden cardiac arrest. Immediate, high-quality CPR and early defibrillation are critical. Nurses must be proficient in recognizing VF on the monitor and initiating the ACLS (Advanced Cardiovascular Life Support) protocol without delay. Identifying and

addressing potential reversible causes (the "Hs and Ts") is also a key nursing role during resuscitation.

Advanced Cardiac Monitoring Considerations

While basic rhythm interpretation is essential, advanced cardiac monitoring involves a deeper understanding of complex arrhythmias, their underlying etiologies, and the nuances of managing patients with implanted cardiac devices or those undergoing specific treatments. These advanced cardiac monitoring nursing tips are crucial for specialized care.

This includes recognizing less common but potentially dangerous rhythms, understanding the implications of ST-segment changes, and managing patients with pacemakers and defibrillators. Furthermore, continuous hemodynamic monitoring in critical care settings provides additional data that, when integrated with the ECG, offers a more complete picture of the patient's cardiovascular status.

ST-Segment Monitoring and Myocardial Ischemia

The ST segment, the portion of the ECG tracing between the end of ventricular depolarization (J point) and the beginning of ventricular repolarization, is a critical indicator of myocardial ischemia or injury. ST-segment elevation can signify an ST-elevation myocardial infarction (STEMI), a medical emergency requiring immediate reperfusion therapy. ST-segment depression, particularly when accompanied by symptoms, can indicate ischemia or a non-STEMI myocardial infarction. Nurses must be vigilant in observing the ST segment, noting any significant changes from the patient's baseline. Promptly reporting any new ST-segment elevation or depression to the physician is a vital nursing responsibility, as it can guide rapid diagnostic and therapeutic interventions, such as cardiac catheterization or thrombolytic therapy.

Pacemakers and Implantable Cardioverter-Defibrillators (ICDs)

Patients with pacemakers and ICDs require specialized cardiac monitoring. Nurses must understand the basic functioning of these devices, including the pacing modes, sensing capabilities, and the expected ECG appearances. For pacemaker patients, monitoring for appropriate pacing (pacing spikes followed by ventricular depolarization) and sensing (the device inhibiting pacing when the patient's own heart beats) is crucial. Failure to pace, failure to capture, or inappropriate pacing are all potential issues that require

immediate attention. For ICD patients, monitoring their rhythm for life-threatening ventricular arrhythmias that trigger defibrillator shocks is paramount. Nurses should also be aware of the patient's specific device settings and any recent programming changes.

Continuous Hemodynamic Monitoring

In intensive care settings, continuous hemodynamic monitoring often complements ECG monitoring. This can include invasive arterial blood pressure monitoring, central venous pressure (CVP) monitoring, pulmonary artery catheterization (Swan-Ganz catheter), and cardiac output monitoring. Nurses are responsible for accurate insertion, maintenance, and interpretation of the data obtained from these lines. For example, a fluctuating CVP might indicate fluid shifts or changes in right ventricular function, while significant changes in pulmonary artery pressures could signal pulmonary hypertension or left ventricular failure. Integrating ECG findings with hemodynamic parameters provides a comprehensive assessment of the patient's cardiovascular status and guides fluid management, inotropic support, and vasopressor therapy.

Documentation and Communication

Accurate and timely documentation and effective communication are indispensable components of excellent cardiac monitoring nursing care. The ECG tracing is a vital diagnostic tool, and its interpretation must be clearly recorded. Furthermore, communicating critical findings to the healthcare team promptly can mean the difference between life and death. These cardiac monitoring nursing tips underscore the importance of a systematic approach to record-keeping and interprofessional collaboration.

Detailed documentation ensures a clear record of the patient's cardiac status over time, aiding in trend analysis and facilitating continuity of care. Effective communication ensures that all members of the healthcare team are informed of significant changes and are able to make timely and appropriate decisions. This collaborative approach optimizes patient safety and care delivery.

Key Elements of ECG Documentation

When documenting cardiac rhythm findings, nurses should include the following essential information:

- Date and time of the strip.

- The interpreted rhythm (e.g., Normal Sinus Rhythm, Atrial Fibrillation).
- Heart rate.
- Rhythm regularity (regular or irregular).
- Presence and relationship of P waves to QRS complexes.
- PR interval duration.
- QRS complex duration.
- Assessment of ST segments (e.g., no ST elevation or depression noted, ST elevation in leads V2-V4).
- Presence of any artifacts and actions taken to correct them.
- Patient's clinical status and any reported symptoms (e.g., denies chest pain, reports shortness of breath).
- Any interventions performed or medications administered.

Effective Communication with the Healthcare Team

Nurses are often the first to detect significant changes in a patient's cardiac rhythm. Therefore, effective communication is crucial. When reporting a change, especially a critical one like new-onset ventricular tachycardia or ventricular fibrillation, nurses should use a structured approach, such as SBAR (Situation, Background, Assessment, Recommendation).

- **Situation:** Clearly state the problem (e.g., "I am calling about Mr. Smith in room 302. He has developed new-onset ventricular tachycardia.").
- **Background:** Provide relevant patient history and current status (e.g., "He is a 72-year-old male admitted with chest pain yesterday.").
- **Assessment:** Report your findings from the monitor and the patient (e.g., "His heart rate is currently 160 bpm, with wide QRS complexes on the monitor. He is complaining of dizziness and is hypotensive at 80/50.").
- **Recommendation:** Suggest the next steps or ask for specific orders (e.g., "I believe he needs immediate intervention. What are your orders for managing this VT?").

Promptly notifying the physician, rapid response team, or code team as per

facility protocol is essential. Clear, concise, and timely communication ensures that the patient receives the necessary medical attention without delay.

Special Populations and Cardiac Monitoring

Cardiac monitoring needs can vary significantly across different patient populations. Children, neonates, pregnant women, and elderly patients may present unique challenges and require tailored approaches. Applying specialized cardiac monitoring nursing tips ensures optimal care for these diverse groups.

Understanding the physiological differences in these populations is key to accurate interpretation. For instance, what constitutes a normal heart rate or rhythm in an adult may be abnormal in a child. Similarly, certain cardiac conditions are more prevalent in specific age groups or physiological states.

Pediatric Cardiac Monitoring

Pediatric cardiac monitoring requires careful consideration of age-specific normal ranges for heart rate and rhythm. Neonates and infants typically have much faster heart rates than adults. Lead placement in children can also be more challenging due to their smaller bodies and greater tendency for movement. Nurses must use pediatric-sized electrodes and may need to employ additional measures, such as sedation or restraints, to minimize artifact. Recognizing congenital heart defects and their associated arrhythmias is also important in this population.

Cardiac Monitoring in Pregnancy

Pregnancy brings about significant physiological changes that can affect the cardiovascular system, including an increase in heart rate and stroke volume. Nurses monitoring pregnant patients must be aware of conditions like gestational hypertension, pre-eclampsia, and eclampsia, which can have serious cardiac implications. Fetal heart rate monitoring is also a critical component of care during labor and delivery, often utilizing different monitoring equipment. Understanding the baseline ECG findings and potential arrhythmias that can arise during pregnancy or postpartum is crucial.

Elderly Patients and Cardiac Monitoring

Elderly patients often have multiple comorbidities, including coronary artery disease, heart failure, and valvular heart disease, which increase their risk for cardiac arrhythmias. They may also have changes in their cardiac conduction system due to aging. Furthermore, polypharmacy is common in this population, with many medications having potential cardiac side effects or interactions. Nurses must carefully assess the impact of these factors on the ECG tracing and be vigilant for signs of medication-related arrhythmias or hemodynamic compromise. Understanding the prevalence of conditions like atrial fibrillation in older adults is also important for risk assessment and management.

Continuous Improvement in Cardiac Monitoring Skills

The field of cardiac monitoring is constantly evolving, with new technologies and a deeper understanding of cardiac pathophysiology emerging regularly. To maintain a high standard of care, nurses must commit to continuous learning and skill development. This dedication to lifelong learning is a vital aspect of excellent cardiac monitoring nursing tips.

This involves not only staying current with best practices and guidelines but also actively seeking opportunities to enhance their knowledge and practical skills. A proactive approach to professional development ensures that nurses are equipped to handle the complexities of modern cardiac care and provide the best possible outcomes for their patients.

Staying Current with Guidelines and Best Practices

Professional organizations such as the American Heart Association (AHA) and the European Resuscitation Council (ERC) regularly update guidelines for cardiopulmonary resuscitation (CPR) and emergency cardiovascular care. Nurses should familiarize themselves with these updated recommendations, particularly those pertaining to ECG interpretation, arrhythmia management, and defibrillation. Attending continuing education courses, workshops, and conferences focused on cardiac nursing and critical care can provide valuable insights into the latest advancements and research findings. Subscribing to relevant professional journals also helps in staying informed about current trends and evidence-based practices in cardiac monitoring.

Utilizing Simulation and Case Studies

Simulation-based education offers a safe and effective environment for nurses to practice and refine their cardiac monitoring skills. Through realistic

scenarios, nurses can hone their ability to interpret complex rhythms, troubleshoot artifacts, and practice emergency response protocols without risk to actual patients. Case studies are another valuable learning tool, allowing nurses to analyze real-world patient scenarios, discuss diagnostic challenges, and collaboratively develop treatment plans. Reviewing challenging ECG strips and discussing them with colleagues or mentors can also foster critical thinking and improve diagnostic accuracy. Regularly participating in code drills and debriefings further strengthens team dynamics and individual preparedness for critical events.

FAQ

Q: What are the most common artifacts encountered in cardiac monitoring, and how can nurses troubleshoot them?

A: The most common artifacts include somatic tremor (fuzzy baseline from patient movement), 60-cycle interference (thick, coarse waves from electrical sources), and baseline wander (slow, undulating baseline from poor electrode contact). Nurses can troubleshoot by ensuring proper skin preparation and electrode adhesion, checking lead connections, minimizing patient movement, and potentially turning off nearby equipment to identify electrical interference.

Q: How can nurses accurately calculate heart rate from an ECG strip, especially in irregular rhythms?

A: For regular rhythms, divide 300 by the number of large boxes between consecutive R waves. For irregular rhythms, count the number of QRS complexes in a 6-second strip and multiply by 10. Advanced monitors often have built-in calculators.

Q: What are the critical differences in recognizing and managing Ventricular Tachycardia (VT) versus Ventricular Fibrillation (VF)?

A: Ventricular Tachycardia (VT) has wide, rapid QRS complexes and may have a pulse, requiring assessment of hemodynamic stability and potential medication or synchronized cardioversion. Ventricular Fibrillation (VF) is chaotic electrical activity with no discernible QRS complexes and no pulse, necessitating immediate CPR and defibrillation as per ACLS guidelines.

Q: Why is proper lead placement so crucial for

accurate cardiac monitoring, and what are the consequences of incorrect placement?

A: Proper lead placement ensures that the ECG monitor receives a clear and representative electrical signal from the heart, allowing for accurate identification of waveforms and rhythms. Incorrect placement can lead to distorted signals, mimicking or masking true cardiac events, leading to misdiagnosis, delayed treatment, or unnecessary alarms.

Q: How should nurses document cardiac monitoring findings, and what information is essential to include?

A: Essential documentation includes the interpreted rhythm, heart rate, rhythm regularity, analysis of P waves, PR interval, QRS duration, ST segment assessment, any artifacts and actions taken, and the patient's clinical status and symptoms. This ensures continuity of care and provides a comprehensive record of the patient's cardiac status.

Q: What are some key nursing considerations for monitoring patients with pacemakers or implantable cardioverter-defibrillators (ICDs)?

A: Nurses should understand the device's basic function, pacing modes, and expected ECG appearances. They need to monitor for appropriate pacing and sensing, identify potential device malfunctions, and be aware of the patient's specific settings and any recent programming. For ICDs, vigilance for appropriate shock delivery for life-threatening arrhythmias is paramount.

Q: How can nurses effectively manage the risk of artifact in cardiac monitoring, particularly in agitated or restless patients?

A: In addition to standard troubleshooting techniques, nurses can try calming the patient, explaining the monitoring process, ensuring comfortable positioning, and using specialized electrodes or securing leads more firmly. In some cases, continuous sedation may be necessary under physician orders if artifacts persist and hinder critical assessment.

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