

# Strategies for Managing Alarm Fatigue in the PICU Setting

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**M**onitor alarm fatigue is caused by exposure to frequent and unnecessary alarm noise, which can desensitize nurses and diminish the urgency of response times to alarms (Bonafide et al., 2015). This possible negative clinical impact may cause frustration and confusion among nursing staff and families, and critically endanger patient care. According to Christensen, Dodds, Sauer, and Witt (2014), nurses identify inappropriate alarm limits, delayed response times to alarms, and hesitancy in acknowledging and responding to another nurse's patient alarm as contributing factors to monitor alarm fatigue.

In the pediatric intensive care unit (PICU), monitors are sensitive to the most minor changes in a patient's condition. Although this level of monitor sensitivity can be beneficial, monitor alarms may not be appropriately set to recognize individual patient needs. The Emergency Care Research Institute (ECRI) (2012) identified alarm fatigue and alarm-related accidents as the most serious technological hazards in health care. This high-impact patient safety concern can cause caregivers to become overwhelmed and desensitized, leading to potential patient harm or death (ECRI, 2012).

## Causes of Monitor Alarm Fatigue

In the PICU, nurses use multiple monitoring devices to assist in the delivery of care. These monitor devices provide life-saving notifications for critically ill children by allowing nurses to continually assess the patient's condition and intervene appropriately.

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The negative impact of monitor alarm fatigue on registered nurses in the pediatric intensive care unit (PICU) can be detrimental to patient safety. Identifying ways to recognize alarm fatigue, providing education to increase competence in technology, and using multidisciplinary collaboration can increase patient/family satisfaction in the PICU. Strategies, such as initiating appropriate alarm limit settings and developing a nursing role to continuously monitor alarms, ensure nurses respond appropriately to monitor alarms, thereby increasing patient safety and quality. Nurses in the specialty of pediatrics can use this information to identify interventions to prevent unnecessary monitor alarms and increase patient safety and quality of care.

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Unfortunately, monitoring devices are also notorious for causing excessive nuisance alarms and constant noise that result in failure to detect true changes in patient status (Bonafide et al., 2015). Nuisance alarms provide false readings, such as ventricular tachycardia during chest physiotherapy or low-quality pulse oximetry readings when the patient moves an extremity. The nuisance alarm inaccuracy was recognized as a significant contributing factor of alarm fatigue by 57% of nurses in the critical care setting (Christensen et al., 2014). This sensory overload is related to strict monitoring parameters, inadequate electrode care, and minimal differentiation of critical alarm sound levels. Successful reduction of monitor alarm fatigue relies on the identification of nuisance alarms posing a threat to alarm desensitization.

## Inappropriate Pediatric Vital Sign Limitations

The pediatric critical care population has a wide range of vital sign boundaries regarded as acceptable within the hospital setting. These boundaries are often initially overlooked by nurses and physicians due to the emergent nature of admissions or transfers into the PICU. Inappropriate vital sign

boundaries restrict accuracy based on patient age, admission diagnosis, and other underlying factors in care. The misidentification of pediatric vital sign boundaries results in the desensitization of nurses to determine urgency of alarms and are responsible for approximately 95% of false alarms (Dandoy et al., 2014). Identifying appropriate boundaries is essential because critical interventions are based on a patient's vital signs and hemodynamic stability.

ECRI (2015) suggests inadequate alarm configuration policies contribute to excessive alarm activation. In the pediatric specialty, patient age is one factor that influences appropriate vital sign ranges. Age is an essential aspect in providing critical care nurses with accurate trends of hemodynamic stability. The American Heart Association (AHA) recommends guidelines in determining appropriate ranges of vital signs for neonates and pediatric patients based on basic life support and pediatric advanced life support algorithms (Chemical Hazards Emergency Medical Management, 2011). For example, a heart rate of 130 beats per minute is acceptable for a one-month-old infant but not acceptable for a 16-year-old adolescent (Chemical Hazards Emergency

Medical Management, 2011). The constant utilization of these guidelines, along with collaboration between members of the healthcare team, may deter inappropriate monitor alarm limits and enable staff to individualize monitor orders as needed to ensure accuracy in patient care. Special considerations are recommended for specific pediatric populations, such as single ventricle cardiac physiology or preterm neonates (Hazinski, 2013). Recommendations for vital sign limitations should be determined on an individual basis.

Unfortunately, only 20% of monitors are programmed with age-appropriate monitor limits (Dandoy et al., 2014). When generalized alarm limits are used, nurses are slower to respond to critical notifications. Increasing the use of patient age and specific illness or disease process alarm limits places the focus on patient condition instead of managing monitor alarm systems (Ketko, Martin, Nemshak, Niedner, & Vartanian, 2015).

## Management of Alarm Fatigue

The application of a team-based approach to identify specific monitor limits and true crisis alarms may manage alarm fatigue and positively affect patient care. The pediatric intensive care nurse can be an advocate in discussing appropriate monitor limitations with the healthcare team. Moreover, continuous education regarding the utilization and troubleshooting of monitoring devices may allow for the prevention of adverse events. Managing these alarm hazards may increase patient safety and may prevent serious adverse events (ECRI, 2012).

## Quality and Safety Committees

Emphasis on individualizing monitor limits and abolishing inappropriately set alarms are strategic factors in desensitization. The initiation of quality and safety committees to monitor adverse events related to monitor fatigue may assist nursing staff in identifying areas for improvement (ECRI, 2012). ECRI (2012) suggests taking a non-punitive approach, and encouraging reporting of missed alarms, and nursing response to alarms can assist to identify stressors. Participation on these committees could provide a forum for the critical care team to discuss and suggest ways to combat monitor fatigue without

feeling criticized or critiqued on clinical judgment. Alarm fatigue and nursing hesitation could prove detrimental to unit teamwork and patient safety. Working toward a team-based resolution to combat monitor alarm fatigue may assist staff to recognize patient safety, which is crucial in the PICU.

## Multidisciplinary Collaboration

Multidisciplinary collaboration can lead to positive changes in overcoming alarm fatigue in the PICU. Recommendations, including team-based evaluation of monitor parameter limitations, frequent assessment of the necessity of extensive monitoring, and the initiation of a unit-based monitoring notification and response system, may assist in the decrease of the frequency monitor alarm (Dandoy et al., 2014). Unit-based monitoring allows for special considerations of pediatric vital sign limitations and for staff to assess patient needs on an individual basis. Compliance with the evaluation of extensive monitoring may provide nurses with cues for earlier de-intensification interventions.

The communication between nurses and physicians allows for the evaluation of monitor parameters and the necessity of invasive monitoring. Focusing on narrow or imprecise limitations for oxygen saturation, heart rate, and blood pressures often provides minimal buffering for patient movement, agitation, or activities of daily living. Initial discussion of monitor parameters increases the reliability of alarms and affords target ranges for specific patient diagnoses. Dandoy et al. (2014) suggests documentation of limitation order sets in the electronic health record to serve as a starting point for patient monitoring. Nurses are less affected by alarm fatigue and distraction when the development of parameters for individual patients or diagnosis is identified upon arrival to a unit (Ketko et al., 2015).

A multidisciplinary approach within nursing provides multiple individuals with responsibility for patient safety and alarm management. ECRI (2012) recommends facilities appoint specific monitor observation roles to nurses within the PICU to ensure that appropriate bedside nurses are alerted and responsive to changes in patient condition. Assigned roles and responsibilities could include a nurse responsible for interpreting alarm notifica-

tion, a nurse responsible for responding to the alarm, and a backup nurse to respond in the event the primary nurse is unavailable.

A nurse or an advanced patient care technician assigned to monitor alarm notifications is beneficial in assisting primary caregivers with knowledge of potential patient decompensation. Although a primary nurse providing care for multiple patients may not be able to visualize each alarm, the monitoring individual can filter inappropriate alarms and direct notifications to appropriate personnel based on the severity of the alarm. The individual responsible for monitoring alarm notifications is part of a team-based approach to patient safety and resolving potential issues.

The use of a multidisciplinary approach enables multiple nurses to respond to a deteriorating patient. This could decrease excessive noise and allow nurses to provide more efficient care (Institute of Medicine [IOM], 2011). The utilization of a nurse to serve as a backup for the primary nurse provides an additional layer of safety for patients with subtle or quickly deteriorating statuses. Nurses who could be considered a backup to the primary nurse include the charge nurse, clinical leader, or resource nurse. In the event of a high-patient volume or high-patient acuity, multiple backup nurses could be assigned to certain sections of the unit.

## Technology Advancements And Compliance

The assimilation of technology and computer programming encourages healthcare providers to strive for more efficient and progressive ways to care for patients and families. Enhancing the knowledge of nurses by providing various training programs and orientation to monitoring equipment ensures nurses are prepared to differentiate and respond to critical alarms in a proficient manner. ECRI (2015) recommends that all nurses become trained to use technology to establish a culture of safety and avoid adverse incidents related to alarm hazards. Qualified nurses can identify and manage potential malfunctions with a monitor and limitation setting. In addition, clinical ancillary staff, such as advanced patient care technicians, can be trained to identify excess alarms and troubleshoot potential errors when the primary nurse is unavailable.

Clinician-carried communication

## Instructions For Continuing Nursing Education Contact Hours

### Strategies for Managing Alarm Fatigue in the PICU Setting

Deadline for Submission: October 31, 2019

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1. To obtain CNE contact hours, you must read the article and complete the evaluation through the *Pediatric Nursing* website at [www.pediatricnursing.net/ce](http://www.pediatricnursing.net/ce)
2. Evaluations must be completed **online** by October 31, 2019. Upon completion of the evaluation, your CNE certificate for **1.3** contact hour(s) will be mailed to you.

#### Learning Outcome

After completing this learning activity, the learner will be able to recognize alarm fatigue and implement strategies to manage monitor alarms thereby improving patient safety and quality.

#### Learning Engagement Activity

Ask yourself the following questions:

- Does your department have a policy/procedure in place that requires specific alarm settings?
- Are the alarm settings based on the patients age?
- Does the policy/procedure allow for special considerations for specific pediatric populations?

Access the following website to review the recommended vital sign parameters in children: <https://chemm.nlm.nih.gov/pals.htm#sec2>

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devices, such as pagers and portable phones, provide notification when the primary nurse is tending to another patient. These devices display notifications and give the nurse the opportunity to call for assistance or immediately assess patient condition. Clear and concise messages, as opposed to solely auditory monitor alarms, allow nurses to determine the sense of urgency needed in responding. Clinician-carried communication devices promote an increased response time, provide notifications to nurse-specific patients, and can be adjusted to meet patient needs (ECRI, 2012).

#### Impact of Monitor Alarm Fatigue on the Pediatric Intensive Care Nurse

Evaluating the impact of alarm fatigue on PICU nurses is essential to patient and nurse satisfaction. Nurses in the critical care setting often report auditory annoyance, mental fatigue, and difficulty with verbal communication (Solet & Barach, 2012). Alarm desensitization contributes to a signif-

icant reduction in the effectiveness of patient- and family-centered alarm management. Over 70% of nurses strongly agree that nuisance alarms directly disrupt patient care (Solet & Barach, 2012).

Christensen et al. (2014) suggest novice nurses often feel uncomfortable responding to an experienced nurse's patient for fear of being criticized or unable to adequately intervene. Experienced nurses may feel the additional assistance is an indirect scrutiny of the nursing care being provided because of the long response time to the monitor alarm. Failure to constructively educate nurses on alarm management may cause a division of the unit, defensive behaviors with staff, and increases the probability of nurses silencing alarms with no intervention or assessment.

#### Patient- and Family-Centered Care

Patient- and family-centered care is evolving as an underlying framework in the pediatric setting. Due to the delicacy and instability of pediatric

patients in the intensive care unit, family members may acquire an overwhelming sense of fear, stress, and loss of control. Parents and family members put complete trust and confidence in healthcare providers to provide a holistic and well-rounded experience in a critical atmosphere (Institute for Patient- and Family-Centered Care, 2017). Frequent monitor alarming, inability to interpret monitoring systems, and lack of urgency noted in the nursing staff responding to the alarms are measures that may influence satisfaction and expectations in the effectiveness of treatments.

Parents of critically ill children with knowledge of their child's baseline status can assist in the development of adequate limitations of monitors. For example, an 8-month-old child admitted to the PICU with a surgical history, including the bidirectional Glenn cardiac procedure, will require special considerations to keep oxygenation levels appropriate for single ventricle cardiac physiology (Hazinski, 2013). Parents can actively discuss pulse oximetry limitations

and variations with the critical care team. Allowing patients and families to participate in patient care, decision-making, and information sharing may serve as interventions for managing alarm fatigue (Institute for Patient- and Family Centered Care, 2017). By targeting excessive monitor alarms, Press Ganey scores related to noise in and around the patient room, promptness to call lights, and overall assessments may improve (Whalen et al., 2014).

The excessive amount of monitor alarms in pediatric critical care units can easily become overwhelming and ignored by PICU nursing staff. The impacting fatigue nurses endure may increase the risk of impaired judgment, decrease response times to alarms, and decrease patient safety. Identifying causes for alarm fatigue, managing alarm fatigue, and determining the impact of alarm fatigue on nurses can assist in the prevention of adverse clinical events and ensure prompt assessment of a patient's condition. Further, preventing monitor alarm fatigue could positively impact the patient- and family-centered experience by providing a trusting

and therapeutic environment that supports the well-being of critically ill pediatric patients. ■■■

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