J Nurs Care Qual
Vol. 28, No. 4, pp. 292–294

The Joint Commission Update

In this column an expert from The Joint Commission provides an update for readers.

Improving Medical Device Alarm Safety in Hospitals

Mark G. Pelletier, RN, MS

ALTHOUGH alarm-equipped devices such as ECG (electrocardiogram) machines, pulse oximetry devices, bedside telemetry devices, infusion pumps, and ventilators are essential to providing patient care, nurses and other clinicians may face alarm fatigue that compromises safety.[1] The number of alarm signals per patient per day can reach several hundred depending on the unit within the hospital, translating to thousands of alarm signals on every unit and tens of thousands of alarm signals throughout the hospital every day.[1] Although the frequency of alarms is high, it is estimated that between 85% and 99% of alarm signals are false alarms or clinically insignificant.[1,2] This means that most alarms do not trigger a response or intervention.[2] Reasons for the false alarms include failure to adjust default settings for the individual patient or for the patient population, resulting in too-tight setting of alarm conditions; dried-out ECG electrodes; and incorrectly positioned sensors.[3]

THE PROBLEM

As a result of the frequency of nuisance alarms, clinicians may turn down the volume of the alarm, turn off the alarm, or adjust the alarm settings outside the limits that are safe and appropriate for the patient. Such action can result in serious consequences. Over a recent 4-year period, a US Food and Drug Administration database showed that there were more than 560 alarm-related deaths, and The Joint Commission's Sentinel Event database included reports of 80 alarm-related deaths and 13 serious alarm-related injuries during a similar period.[1] For the reported events, major contributing factors were absent or inadequate alarm systems, improper alarm settings, alarm signals not audible in all areas, and alarm signals inappropriately turned off.[1] Common injuries or deaths related to alarms included those from falls, delays in treatment, ventilator use, and medication errors.[1]

In addition to the contributing factors reported to The Joint Commission's Sentinel Event database, other factors that contributed to alarm-related sentinel events were identified. Alarm fatigue was the most common contributing factor.[1] Inadequate staff training on the proper use and functioning of the equipment (eg, inconsistent team training, response, and interpretation of alarm signals)

Author Affiliation: *Division of Accreditation and Certification Operations, The Joint Commission, Oakbrook Terrace, Illinois.*

The author declares no conflict of interest.

Correspondence: *Mark G. Pelletier, RN, MS, Chief Operating Officer, Division of Accreditation and Certification Operations, The Joint Commission, One Renaissance Blvd, Oakbrook Terrace, IL 60181 (mpelletier@jointcommission.org).*

DOI: 10.1097/NCQ.0b013e3182a268b9

was also reported as a contributing factor.[1] Other issues associated with failures included inadequate staffing to support or respond to alarm signals, alarm conditions and settings that were not integrated with other medical devices, and equipment malfunctions and failures.[1]

A SEARCH FOR SOLUTIONS

Patient deaths related to alarms on monitoring devices have been the focus of national media attention, and The Joint Commission has suggested that alarm-related events are underreported.[1] The issue has also been the subject of special reports by the Association for the Advancement of Medical Instrumentation and ECRI Institute.[3-5] ECRI Institute has listed medical device alarms as the top hazard for a number of years.[5] In addition, The Joint Commission, the Association for the Advancement of Medical Instrumentation, ECRI Institute, and the American College of Clinical Engineering convened a summit of patient safety and health care experts to seek solutions to problems with medical device alarms.[6] The summit resulted in a designation of medical alarm systems as the top health technology hazard, and a call to action to use available evidence to identify and prioritize problems with alarms systems and explore opportunities and solutions to address alarm problems.[6]

Following the summit, The Joint Commission issued a Sentinel Event Alert in 2013 to provide recommendations and strategies to improve device alarm safety.[1] Beyond the Sentinel Event Alert, The Joint Commission will implement a National Patient Safety Goal in 2014 to spotlight the issue and establish alarm system safety as a priority for accredited hospitals and critical access hospitals. The Joint Commission already has numerous accreditation standards in place related to alarm safety. The standards address issues such as leadership, the environment of care, provision of care, and staff training and education.

PROPOSED SOLUTIONS

Although issues vary greatly among hospitals and even within different units in a single hospital, consensus has arisen around a series of actions related to people, processes, and technology in order to reduce risks related to medical device alarms.[1] Leadership and a multidisciplinary approach have been suggested as necessary.[1,3-6] This includes establishment of a process for safe alarm management and response in areas identified by the organization as high risk; identification of the default alarm settings and the limits appropriate for each care area; establishment of guidelines for alarm settings on alarm-equipped medical devices used in high-risk areas and for high-risk clinical conditions; creation of guidelines for tailoring alarm settings and limits for individual patients; and inspection and maintenance of alarm-equipped medical devices to provide for accurate and appropriate alarm settings, proper operation, and detectability.

The alarm summit also resulted in a list of recommendations that health care organizations can implement immediately while research and longer-term solutions are developed. The proposed strategies are grounded in cross-disciplinary leadership support and cross-functional teams that include clinical leadership.[6] Alarm conditions may also be improved by conducting technology assessments and planning based on clinical needs and testing of acoustics on clinical units and by the use of clinical evidence to guide implementation of alarm system configuration policies.[6] These and other recommendations recognized that improving medical device alarm safety requires more than technology-based approaches; rather, a series of systems-based changes is necessary to achieve desired change in attitudes, behaviors, and equipment.[1,6]

MEDICAL DEVICE ALARMS AND NURSING

Regulators, medical device manufacturers, health care engineers, and health care researchers have all been identified as contributors to improving medical device alarm safety. A number of recommendations for improving the safety of medical device alarms are also relevant to nursing. Specifically, The Joint Commission has recommended training and education for all clinical care team members on safe alarm management and response in high-risk areas.[1] This recommendation includes nurses, who are most frequently the point of contact at the bedside. Nurses and other clinicians should receive ongoing training on new alarmed medical devices and updates to alarmed medical devices, and leadership should ensure that new members of the clinical care team receive training on the alarmed medical devices on which they rely.[1] In addition, nurses and others from across the organization should consider how to reduce nuisance alarm signals and to determine whether critical alarm signals can actually be heard in patient care areas.

Other strategies that have been suggested include improving core competencies for nurses based on use environments.[6] Organizations may address this issue through precertification and mentoring programs, along with education and training from vendors of alarmed medical devices. ECRI Institute has also suggested empowering nurses to customize each patient's alarm settings to actionable levels within 1 hour of assuming care for the patient and as the patient's condition changes.[5]

Seeking input from patient care providers such as nurses, along with health care engineers, risk managers, and information technology professionals, organizations should also establish policies and processes for alarm safety that include the regular review of trends and patterns that reveal improvement opportunities.[1] Organizations have been urged to share information about alarm-related incidents, prevention strategies, and lessons learned with safety organizations such as the Association for the Advancement of Medical Instrumentation, ECRI Institute, the Food and Drug Administration, and The Joint Commission.[1]

CONCLUSION

Alarm fatigue and management of alarms are important safety issues. Nurses play an important role in an organization-wide, multidisciplinary approach to understanding medical device alarm problems, gathering input from stakeholders to assess organization circumstances, and developing a systematic, coordinated approach to alarms. By making alarm safety a priority, lives can be saved.

REFERENCES

1. The Joint Commission. *Sentinel Event Issue 50: Medical Device Alarm Safety*. Oakbrook Terrace, IL: The Joint Commission; 2013.
2. Cvach M. Monitor alarm fatigue: an integrative review. *Biomed Instrum Technol*. 2012;46(4): 268-277.
3. Alarms pose challenges to healthcare facilities. *Biomed Instrum Technol*. 2011;(suppl):5.
4. Keller JP, Diefes R, Graham K, Meyers M, Pelczarski K. Why clinical alarms are a "top ten" hazard: how you can help reduce the risk. *Biomed Instrum Technol*. 2011:(suppl):17-23.
5. ECRI Institute. Top 10 health technology hazards for 2013. *Health Dev*. 2012;41(11):1-23. https://www.ecri.org/Documents/Secure/Health_Devices_Top_10_Hazards_2013.pdf. Accessed June 7, 2013.
6. Association for the Advancement of Medical Instrumentation. Clinical alarms. 2011 summit. http://www.aami.org/htsi/alarms/pdfs/2011_Alarms_Summit_publication.pdf. Accessed June 7, 2013.