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WHITEPAPER

A Guide to Modernizing Alarm Management



Introduction

Alarm communications management has caused alarm fatigue in healthcare for decades, leading to inefficient workflows, clinician burnout, poor staff retention rates and lower patient satisfaction, all of which may compromise patient safety. Providers, especially nurses, face hundreds of non-actionable alarms per shift, with 85-99% of alarms not requiring clinical intervention according to the Joint Commission.^{1,2}

The main challenge lies in distinguishing actionable alarms (the alarms that truly matter) from the noise. Nurses spend up to 35% of their working time responding to alarms, which often leads to sensory overload. Alarm fatigue results in delayed reactions or complete ignoring of alarms.

Implementing automated systems for identifying high-risk patients and deploying rapid-response teams in hospitals has been shown to significantly decrease mortality rates, reduce ICU admissions, shorten durations of hospital stays and improve patient outcomes.

Eliminating the risks posed by non-actionable alarms is crucial to addressing the significant strain and inefficiency they create in patient care environments. Implementing automated systems that efficiently identify high-risk patients and enable rapid response is essential to transforming patient care.

This guide offers a step-by-step approach to implementing a modern alarm management process.

Step 1: Establish an alarm committee

Establishing an alarm committee represents an important first step for healthcare organizations. The committee should comprise members who oversee system-level alarms and clinicians working directly with patients.

Alarm committees are tasked with developing, implementing, and managing the alarm management process. Alarm management processes should be dynamic and require regular updates. The ongoing role of the alarm committee requires a flexible approach, emphasizing the need for continuous review and updates to adapt to evolving healthcare environments.



Step 2: Implementing alarm management middleware technology

Health systems and hospitals should engage a vendor with expertise in alarm communication management and experience in understanding technology configurations and integrating disparate technologies into a unified platform. It is best to select a vendor with a team of clinical and technical experts who can analyze current workflows, identify improvement areas, and assist in thinking through escalation paths. Additionally, the vendor should aid in creating exceptions to standards for different floors or units, developing metrics for measuring response times, monitoring staff compliance, and standardizing communication methods.

Selecting the right vendor and technology is critical because the implementation goes beyond merely introducing new software. Implementing a modern alarm management solution involves a comprehensive change management process that includes extensive education, policy review, and modifications to ensure stakeholders grasp the significant impact of the changes. This is an ongoing project and continuous support is a must.

Step 3: Document goals

Healthcare organizations should engage in critical thinking and document the challenges they want to address. Hospitals and health systems should record each objective and define what success looks like, such as enhancing staff satisfaction, accelerating response times to critical alarms, bolstering patient safety, refining communication, or minimizing sentinel events — possibly pursuing all of these and more.

It's best to establish precise key performance indicators for every goal, gather data prior to and following the deployment of alarm technology, and evaluate performance to identify success metrics or areas needing improvement.



Step 4: Standardize across the organization

Acute care facilities should initiate their process by evaluating their current alarm notification and assignment procedures to pinpoint areas requiring enhancement, particularly looking for inconsistencies across departments, specialized rules for managing life-threatening conditions, and the prevalence of non-actionable alarms.

After evaluating their processes, organizations should implement uniform alarm standards across all departments and units to ensure consistent alarm response protocols for nurses and monitor technicians, even across different floors. Initial efforts should focus on standardizing alarms in similar care areas, monitoring staff response times and alarm frequency, and setting clear guidelines for alarm management.

Hospitals and health systems should also update their policies to mirror best-practice recommendations and regularly verify adherence to these standards. They should ensure their technology infrastructure supports the ability to tailor alarm standards as needed.

Step 5: Customize alarms when appropriate

Not all floors, units, and patients are the same. That's where customization comes in. Clinicians should have the ability to tailor alarm limits according to each patient's baseline vital signs, adhering to guidelines established by the facility's policies and procedures.

While standardization is crucial in larger enterprises to prevent confusion -- given staff often work across various areas, leading to potential inconsistencies in alarm sounds -- it's also essential to allow a degree of customization, particularly for patient-specific needs within specialized care areas. For instance, critical care areas like adult ICUs and NICUs, despite being similar, cater to vastly different patient populations and therefore require distinct alerts. Balancing standardization with customization addresses both the efficiency of healthcare delivery and the unique care requirements of individual patients.



Step 6: Define escalation pathways

Acute care settings should design and implement alarm escalation pathways to guarantee that critical alarms are addressed promptly, in the event the clinician assigned to respond to the alarm is unable to do so.

A typical escalation pathway progresses from 1) the primary care nurse to 2) a buddy nurse and finally to 3) the charge nurse, with specific time allocations for each stage. If a nurse is unable to respond, the alarm automatically escalates to the next individual in the sequence.

These escalation pathways may need to be updated for each shift and entered into the alarm management system by the clinical support staff. This procedure ensures that monitor technicians are informed about the current escalation pathways and nurses receive the alerts designated for them.

Step 7: Get ahead of issues that cause false alarms

An estimated 85% of clinical alarms are non-actionable.² The prevalence of non-actionable alarms contributes significantly to alarm fatigue. To mitigate this, healthcare organizations can begin by analyzing informational alarms and establishing specific procedures aimed at reducing alarm fatigue.

For instance, implementing a routine process for electrode replacement can significantly reduce artifact alarms. Nurses should be instructed to set monitors to standby mode when patients are out of bed, preventing monitor technicians from receiving false alarms. Additionally, routine requests should be directed to nurse assistants rather than primary nurses to further reduce unnecessary alarm burden.



Step 8: Eliminate paper and enforce digital documentation

To enhance operational efficiency, hospitals and health systems should adopt comprehensive digital documentation practices. This approach should include enabling nurse managers or charge nurses to input nurse shift assignments directly into the alarm management platform, bypassing the need for manual transcription, thereby conserving valuable time. Furthermore, it is imperative to transition the cardiac rhythm strip management process to a fully digital format. The conventional approach, which involves extensive printing, cutting, copying, labeling and scanning of cardiac rhythm strips before uploading them to the electronic health record (EHR) for physician review, is both time-consuming and costly.

Healthcare organizations should look for technology solutions that facilitate access to digital cardiac rhythm strips via mobile devices and the web, offer digital calipers, allow the addition of clinical interpretations, and support digital physician approval for direct EHR integration. The ideal technology should automatically track documentation for each event, providing near real-time compliance monitoring.

Step 9: Standardize methods to eliminate variation in processes

Standardizing communication methods and reducing the number of communication modalities can help minimize variations in processes, streamline operations, and enhance the efficiency and effectiveness of care delivery.

By establishing uniform communication protocols, healthcare organizations can ensure that all staff members, regardless of their department or unit, follow the same procedures for alarm notifications, escalations, and other critical communications.

Reducing the number of communication modalities used within healthcare organizations is also a pivotal part of an alarm management strategy. Current communication modalities include a mix of pagers, smartphones and other devices, each with its own set of functionalities and limitations.

Simplifying the communication infrastructure not only supports a more efficient workflow but also significantly diminishes the cognitive load on clinicians, thereby reducing alarm fatigue and increasing focus on patient care.



Step 10: Analyze the data and iterate

Hospitals and health systems should use analytics to gain deep insights and identify areas for improvement. It is critical to employ technology that extracts data from primary source systems and presents it in a user-friendly dashboard. This technology should enable users to view and analyze alarm data according to various criteria, including date range, facility, unit, severity, category and alarm type. By examining variances in this data, organizations can pinpoint staff members who do not adhere to established standards and offer targeted training to enhance compliance.

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4. Escobar, G. J., Liu, V. X., Schuler, A., Lawson, B., Greene, J. D., & Kipnis, P. (2020). Automated Identification of Adults at Risk for In-Hospital Clinical Deterioration. *The New England journal of medicine*, 383(20), 1951–1960. <https://doi.org/10.1056/NEJMsa2001090>

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