2014 Gage Awards

Reference #	7493646
Status	Complete
Name of hospital or health system	Boston Medical Center
Name of project	Alarm Management Quality Improvement Project
CEO name	Kathleen E Walsh
CEO approval	Check here to confirm that your CEO approves of this project being submitted for a 2014 Gage Award
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Within which of the two categories does your application best align?	Quality

1. Provide a brief description of the project. (This section should resemble an abstract for a poster presentation or an abstract for a peer reviewed journal. Include an objective, data sources, study design, findings, and conclusions.)	The Alarm Management Quality Improvement Project (the Alarm Project) identified a successful methodology that other hospitals can use to safely reduce the number of audible clinically insignificant alarms and thereby eliminate alarm fatigue. The Emergency Care Research Institute (ECRI) identified alarm hazards and alarm fatigue as the number one health technology hazard of 2013.1 James Keller, VP of Health Technology Evaluation and Safety at ECRI stated, “The work that the Task Force initiated, piloted and implemented at BMC has the potential to markedly change the way that telemetry monitoring is performed nationwide.” Boston Medical Center (BMC) was the only hospital featured on a May 2013 Joint Commission webinar on alarm fatigue in which more than 1,000 hospitals participated. In June 2013, the Joint Commission announced the creation of a new national patient safety goal focused on clinical alarm safety which calls on hospitals to develop a systematic, coordinated approach to alarms.13, 14 ECRI, Joint Commission and the Food and Drug Administration (FDA) report numerous alarm-related incidents due to alarms being turned off, ignored or simply missed.2-9 These organizations believe that the actual incidence of patient harm related to alarm hazards and clinical alarm fatigue is significantly underreported.6,7 In addition to threatening patient safety, alarm frequency and decibel level may also affect quality of care by intensifying patient anxiety, detracting from the healing environment and affecting patients’ perceptions of care. Literature reports that up to 70% of patients admitted through the Emergency Department with one of the top ten most common Emergency Department diagnoses may meet criteria for inpatient cardiac monitoring, based on the Practice Standards for Electrocardiographic Monitoring in Hospital Settings: an American Heart Association Scientific Statement.10 Because of these guidelines, the number of cardiac monitors that are connected to hospitalized patients either directly (hardwire monitoring) or wirelessly (telemetry) has multiplied exponentially (this includes those monitors used in all clinical settings and on general medical-surgical units).11 Cardiac telemetry equipment is used across BMC. This project focused on a general cardiology medical unit (Pilot Unit) where telemetry is used as a monitoring device for heart rate and a variety of cardiac arrhythmia signals. Prior to our project, clinically insignificant alarms were competing with alarms which required immediate action. In October 2011, the Telemetry Task Force (TTF) convened to examine alarm fatigue given recent sentinel events at other institutions. The goal of the Alarm Management Quality Improvement Project was to identify methods to safely reduce the number of audible alarms that were clinically

	insignificant thereby eliminating alarm fatigue.
1A. Attachment, if applicable (Applicable examples include a peer reviewed journal article, other content published in the literature, or a presentation at a national meeting)	Attachments.pdf (1649k)

2. Describe the methods use in this project. Include where, why, and how the project was accomplished.	The multidisciplinary TTF included BMC's CMO, a cardiologist; physicians; Director of Clinical Engineering; Clinical Service Manager Nurse Practitioner, Cardiology; Nursing Directors; telemetry training Clinical Instructors; and a Quality and Patient Safety Specialist. The TTF evaluated baseline alarm data for two weeks prior to the Alarm Project starting the end of July, 2012 from two higher acuity telemetry units in order to validate the type of alarm conditions that occurred, to establish a baseline and identify a strategy for creating improvements. On the Pilot Unit, which accommodates 28 monitored patients, an average of 87,870 alarms sounded weekly, 12,546 alarms daily. The impact of the alarm frequency and decibel level was evaluated through p surveys. Survey data supported the need to decrease alarms while ensuring that all critical alarms continued to sound. TTF hypothesized that reducing the number of clinically insignificant audible alarms would benefit patients and nursing staff. TTF shared the initial data and findings with institutional stakeholders. Given the success of the project on the Pilot Unit, senior management and the Quality and Patient Safety Council awarded the TTF team a $25,000 Patient Safety Grant to implement the initiative on all 10 inpatient medical-surgical units. TFF held Informational meetings with Senior Leadership, Nursing, the Clinical Instructors and the Departments of Surgery and Medicine to identify the proposed roll out, the data collection methods and anticipated benefits. Additionally, intensive education regarding the project design and responsibilities for the nursing staff and physicians followed. This included alarm review, communication between nurses and the medical staff and changes to the order sets. The TTF engaged with and educated patients about this initiative. Observations of nursing staff's response to monitors revealed that Patient Status Arrhythmia and Patient Status Heart Rate Parameter Limit Warning alarms were the most significant contributors to excessive noise. Alarm data mined from the telemetry system confirmed that these two warning alarms contributed to clinical alarm fatigue. With this information, the TTF worked to determine which alarms did not require nurses' action. Extracting data from the telemetry system and serial observation of staff response informed evaluation of the significance of low level rate and arrhythmia alarms. The TTF used Lean A3 tools to identify alarm issues and several opportunities to help manage the technology and communication between the care teams, including: order sets that better reflected changes in the patients' condition, improved training on telemetry and identifying the highest frequency of alarm types. A decade of ECRI alarm fatigue data provided the evidence-base for this project.

3. Describe the results of the project. What data was used to support improvement results?	Absent targeted interventions, patient satisfaction scores improved in Press Ganey ® percentile ranks in several metrics in the seven months following the project as compared to the seven months prior to the project: the nurse domain rank increased by 15 percentile points; noise in and around the room rank increased by 12; promptness to call lights rank increased by 39; personal issues domain rank increased by 30 and overall assessment rank increased by 31. Comparison of alarm data in the two-week periods prior to and following implementation of the project demonstrated an 89% reduction in the number of audible alarms per week on the Pilot Unit. The most significant result was a 93% reduction in the combined Bradycardia, Tachycardia and Patient Status Heart Rate Parameter Limit alarms from 62,793 to 3,970 per week. The decibel level on the Pilot Unit prior to the project ranged from 54dBs to 90dBs (the equivalent of heavy road traffic); following parameter implementations, the decibel level decreased to a range of 60dBs to 72dBs. Anonymous surveys of nursing staff about perception of the noise level on the unit showed an increase of percent of respondents who assessed the noise level as “acceptable,” from 0% to 64%. Nursing staff were also asked to share perceptions about the changes associated with the project; survey comments demonstrated nursing staff satisfaction. As the noise level on the Pilot Unit fell, nursing staff reporting feeling less fatigued at the end of shift, consistent with Montague’s observation that nurses and other healthcare staff are affected by high noise levels and tend to report increased stress and exhaustions in such environments.12 Comparison of extracted alarm data before and during the project show a 91% decrease in Patient Status Arrhythmia alarms, a 94% decrease in Patient Status Heart Rate Parameter Limit alarms and a 36% decrease in System Status alarms. In the year preceding the Alarm Project, there was one patient safety incident report related to cardiac monitor alarms, specifically a warning alarm missed at time of its occurrence. In the remainder of 2012 and 2013, there were no incident reports involving cardiac alarms. Review of rapid response team (RRT) activations and Code Blues on the Pilot Unit in the six months before and following the project indicated a constant number of RRT activations and a 50% decrease in Code Blues from six to three. The totality of these improvements is a result of the poject. Other initiatives were not underway and organizational factors remained constant throughout the duration of the Alarm Project. The methodology required alarm data from the monitoring system. This data is commonly under the purview of the manufacturer and accessing

	the data, therefore, required negotiations with the manufacturer.
4. Describe what happened as a result of the project. Was the improvement related to the intervention? Can the project be duplicated by other organizations?	We achieved sustained alarm fatigue elimination by reducing the number of clinically insignificant audible alarms. BMC's work has been recognized by the Joint Commission and the ECRI, and aligns with the Joint Commission's new national patient safety goal focused on clinical alarm safety which calls on hospitals to develop a systematic, coordinated approach to alarms.13, 14 The methodology by which we achieved these results can be implemented by other institutions in an effort to understand and improve their cardiac alarm management – without the commitment of additional resources or technology. Institutions should: 1.Establish a broad base multidisciplinary alarm work group; 2.Understand current manufacturer alarm defaults; 3.Work closely with alarm manufacturers from the onset of the project; 4.Extract and evaluate baseline alarm data; 5.Survey staff about alarm volume and frequency pre-project; 6.Engage patients in the alarm fatigue conversation and educate them about the project; 7.Observe staff response to alarms looking for the barriers to timely response; 8.Identify the clinically insignificant alarms in partnership with clinician stakeholders,; 9.Alter alarm settings to remove audible notification for clinically insignificant alarms; 10.Require staff response for all clinically significant alarms; 11.Standardize alarm defaults wherever possible; 12.Empower nursing staff to eliminate false alarms by collaboration with peers to adjust alarm and then later obtaining physician order for change for better management alarms in real time; 13.Survey staff about alarm volume and frequency post-project; 14.Evaluate outcomes; and 15.Disseminate the results among patients and families, management, leadership; government stakeholders; and peers. This project focused on general medical surgical units, similar projects reported in the literature focused on Intensive Care and Progressive Care Units.15 The results of such a project on a general surgical or mixed medical-surgical unit may yield different results. Our project was conducted with equipment from one manufacturer, so the ability to modify defaults on equipment from other manufacturers may vary.

5. Describe how patients, families, and if appropriate, community was included in the work.	The project was highlighted during the February, 2013 Joint Commission survey of Boston Medical Center. Because the team greatly impressed the surveyors with its results, BMC was the featured hospital on a Joint Commission webinar on alarm fatigue on May 1, 2013. The Alarm Project will be published online on December 17, 2013 on the Journal of Cardiovascular Nursing. Additionally, the Alarm Project and the results were presented to the BMC's board of trustees and the BMC community at a monthly Leadership for Change meeting. In addition, the project has been featured in internal BMC communications. Excessive alarms in hospitals are a common complaint of patients and families. The volume and frequency of alarms on many floors result in decreased patient satisfaction. Many family members become frustrated by the speed at which nurses respond to alarms. While it was impossible to survey any one patient or family pre- and post-project, the TTF engaged patients and families in the overall alarm fatigue conversation. This informal data collection suggested that increased access to staff, particularly nurses, which was achieved as a result of the project, is important to patients and their family members. Nursing staff was able to administer meaningful patient care during the time that they previously spent responding to non-urgent and insignificant alarms. Call lights were also reduced, as nurses were more often engaging with patients.
5A. Attachment, if applicable (Applicable attachments include documents created for patients, families, or community members or by them as a result of the project)	References.docx (14k)
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