Application of Practice Standards to ECG Monitoring of Surgical Patients

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Background

Widely accepted practice standards recommend indications for and duration of ECG monitoring in inpatient settings, yet 35 percent of patients with ECG monitoring orders do not meet nationally defined criteria. The burden of inappropriate ECG monitoring falls predominantly on nursing, resulting in patient safety concerns and patient and staff dissatisfaction with noise levels.

Purpose

The purpose of this evidence-based quality improvement project was to apply existing national practice standards in a nurse-led, interdisciplinary strategy to reduce the impact of inappropriate electrocardiographic (ECG) monitoring in surgical patients in an academic medical center.

This project was the first component of a phased strategy to address alarm fatigue in nursing and to foster healing environments for patients.

Methods

- Design: 10 week pre and post-educational intervention
- Setting: Complex 26-bed surgical unit with 17 admitting surgical services
- Participants: Surgical team members (114) and nurses from surgical unit (56)
- Tools: Adapted AHA revised practice standards and Healthcare Technology Foundation Alarm Survey
- Implementation: Daily nurse-led discussion about need for telemetry

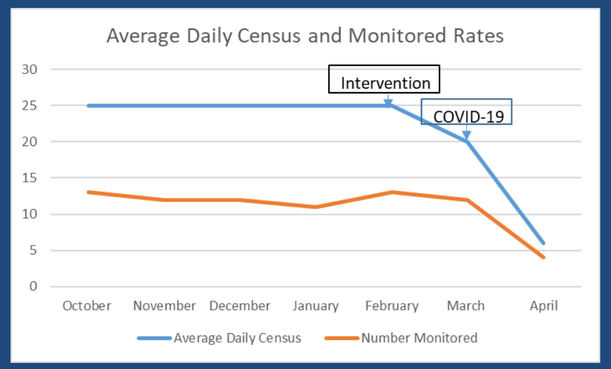
Provider AHA Guidelines for ECG (Telemetry) Monitoring

Class 1 Indications (review in 24 hours)	Class 2 Indicators (review in 48 hours)
Chest pain, low risk, unchanged ECG, negative cardiac enzymes	Chest pain, intermediate or high risk
Unstable VS-SBP < 95m HR > 120 and RR > 20	AV block 2nd or 3rd degree
	New onset or uncontrolled atrial tachyarrhythmia
K+ < 2.9 or > 5.2	Infective endocarditis
Magnesium < 1.3	Acute decompensated CHF
Calcium	Pericarditis
Non- Cardiac major thoracic surgery	CVA, acute
Syncope of unknown origin	Syncope, suspected to be of cardiac origin
Hypertension urgency (Systolic BP > 220 mm Hg or diastolic BP > 120 mm Hg)	Use of QT prolonging medications
Drug overdose or toxic ingestion of arrhythmogenic substances	
New use of beta blockers, calcium channel blockers or amiodarone	

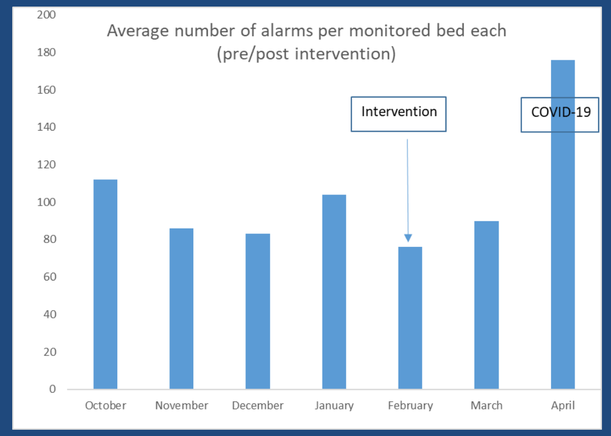
Telemetry NOT Supported		
Non- cardiac surgery who are low risk, asymptomatic and hemodynamically stable	Stable Pulmonary Embolus without hemodynamic instability	Febrile without shock
Chronic stable atrial fibrillation	Chronic PACs /PVCs	Chronic Hemodialysis
Respiratory Illness: pneumonia, asthma or COPD without underlying cardiac disease	History of implanted pacemaker or AICD without evidence of malfunction or misfiring	Anemia not requiring a transfusion

Adapted from Patel & Dowling, 2016 and Sandau et al., 2017. Reviewed by Dr. Gregg Fonarow, University of California Los Angeles, Cardiology, 2019

Results



No significant reduction in monitored patients in pre-COVID 19 intervention period



Alarms per patient per day trended down pre-COVID 19

Perception of Alarm Fatigue

	Preintervention Agreement (n=12)	Postintervention Agreement (n=5)	Percent improvement in score
Nuisance alarms occur frequently	80 %	60 %	33 %
Nuisance alarms disrupt patient care	93 %	80 %	16 %
Nuisance alarms reduce trust in alarms	73.3 %	40 %	12 %
Total nuisance alarm score	93 %	60 %	55 %

Results based on questions 6-8 of the Healthcare Technology Foundation Alarm Survey (2016). Total score was based on aggregating the three ratings together. A higher score reflected more overall agreement with the statements about nuisance alarms.

Despite limited reductions in patients monitored and alarms per patient per day, the perception of alarm fatigue improved

Discussion

There were no statistically significant reductions in alarms or patients monitored over the course of this project, and there was no increase in harm to patients based on Code Blue and rapid response data. There was, however and clinically significant improvement in perception of alarm fatigue. There were some significant limitations during the project including a change in the patient population in response to the COVID-19 pandemic. Surgical cases were severely curtailed, and the unit became a designated COVID-19 rule-out unit primarily managed by a Medicine team. Additionally, the EHR data reflecting number of patients monitored included pulse oximetry monitoring, therefore not accurately reflecting the number of patients on ECG monitoring.

Conclusions

Successful disruptive innovation and change adoption in the complex adaptive system of healthcare is possible with thoughtful consideration of the culture and interdisciplinary dynamics and system priorities. Despite the impact of the pandemic on patient population, this project provides the evidence-based tools necessary to continue to shift ECG ordering practices and reduce the burden of alarms on patients and staff.

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