Medical Xpress

Hospital logs staggering 2.5 million alarms in just a month

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Following the study of a hospital that logged more than 2.5 million patient monitoring alarms in just one month, researchers at UC San Francisco have, for the first time, comprehensively defined the detailed causes as well as potential solutions for the widespread issue of alarm fatigue in hospitals.

Their study is in the Oct. 22 issue of *PLOS ONE* and available online.

The issue of alarm fatigue has become so significant that The Joint Commission, a national organization that accredits hospitals, named it a National Patient Safety Goal. This goal requires hospitals to establish alarm safety as a priority, identify the most important alarms and establish policies to manage alarms by January 2016.

"There have been news stories about patient deaths due to hospital staff silencing cardiac monitor alarms and alerts from federal agencies warning about alarm fatigue," said senior author Barbara Drew, PhD, RN, David Mortara Distinguished Professor in Physiological Nursing in the School of Nursing at UCSF. "However, there have been little data published on the topic to inform clinicians about what to do about the problem. Our study is the first to shed light on cardiac monitor alarm frequency, accuracy, false alarm causes and strategies to solve this important clinical problem."

Alarm fatigue occurs when clinicians become desensitized to the constant noise of alarms and ignore them or turn them off. Among the

numerous detrimental results are anxiety in hospital staff and patients, sleep deprivation among hospitalized patients, and missed life-threatening heart rhythm events.

In the *PLOS ONE* observational study, the largest of its kind to date, Drew and her research team stored monitor data on 461 adults treated in five intensive care units (ICU) at UCSF Medical Center over a 31-day period. The data came from electrocardiogram (ECG) leads (electric cables attaching the electrodes to the recorder); pressure, blood oxygen saturation and respiration waveforms; and user settings and alarms, among other technology.

During that time period, a staggering 2,558,760 unique alarms were recorded, many caused by a complex interplay of inappropriate user settings, patients' conditions and computer algorithm deficiencies. This includes a subset of 1,154,201 arrhythmia alarms, of which 88.8 percent were determined to be false positives caused by the algorithm deficiencies.

Based on these findings and earlier studies, the researchers suggest that medical devices focus on using all available ECG leads to identify the non-disruptive leads and the leads with adequate QRS waveform amplitude. These devices also should provide prompts to aid in more appropriate tailoring of alarm settings to individual patients. And, atrial fibrillation alarms should be limited to new onset and termination of the arrhythmia, with delays for ST-segment and other parameter alarms able to be configured.

"Nurses and patients are barraged by a staggering number of monitor alarms that could be resolved by improved computer algorithms," Drew said. "Our results shed light on the high prevalence of alarms that are mostly false and provide insights into the causes of so many false alarms, along with suggestions for device improvement."

Drew and her colleagues anticipate their study will be cited by current working groups attempting to solve alarm fatigue, led by The Joint Commission, the Association for the Advancement of Medical Instrumentation (AAMI), the International Society for Computerized Electrocardiology (ISCE), the Emergency Care Research Institute (ERCI), the American Heart Association, and the U.S. Food & Drug Administration (FDA) Center for Radiological Devices & Health.

"Because computer devices are more reliable than humans, an opportunity exists to improve physiologic monitoring and reduce alarm fatigue," the authors write.

Provided by University of California, San Francisco

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