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Nursing professor's research focuses on patient safety

Sarah Gardner

Dominican University of California, sarah.gardner@dominican.edu

Dave Albee

Dominican University of California, david.albee@dominican.edu

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Nursing professor's research focuses on patient safety

Research by Dominican University of California nursing professor Patricia Harris examines the accuracy of physiological monitor alarms in the intensive care unit. ICU monitors measure multiple physiological factors and trigger alarms when changes are detected in cardiac rhythm, respiratory rate, blood pressure, or other parameters. The long-term goal of Harris' work is to increase patient safety.

Harris, an assistant professor in the [Department of Nursing](#) in [Dominican's School of Health and Natural Sciences](#), was the project director and co-investigator for the 2013-14 observational alarm study, which is designed to determine the prevalence of false alarms in the ICUs at the University of California San Francisco Medical Center. Analyses of clinically important arrhythmia alarms revealed that almost 90 percent were false or clinically irrelevant. Currently, Harris is focused on additional research, describing patient characteristics associated with these false alarms.

Critical care health professionals rely on the information provided by monitor devices in hospital ICUs for clinical decision-making. When any of the physiological parameters being monitored fall outside the set thresholds, even if only for a few seconds, an alarm can be triggered.

However, false alarms are common. The Joint Commission, a national nonprofit organization that accredits hospitals, has identified "alarm fatigue" as a major safety concern. Alarm fatigue develops when nurses and other health care professionals are exposed to an excessive number of alarms. This sensory overload can result in response to alarms being delayed, alarms being missed altogether, or even alarms being silenced by healthcare staff.

"False alarms in the ICU can lead to a disruption of care, impacting both the patient and the clinical staff through noise disturbances, desensitization to warnings, and slowing of response times," Harris said. "The joint commission has identified alarm management as a national patient safety goal. Hospitals must demonstrate that they have an alarm management plan in place in order to be accredited."

Hospitals need to prioritize alarm safety, identify the most important alarms, and establish policies to manage alarms by 2016.

National attention was brought to the issue of alarm fatigue when a patient died at a Massachusetts hospital after the cardiac monitor was silenced and treatment was delayed. Harris noted that the Joint Commission maintains a Sentinel Event database with reports of alarm-related events. Between 2009 and 2012, 98 events were reported, 80 of which resulted in death ("Sentinel Event Alert," Issue 50).

The 2013-14 alarm study examined data on 461 adult patients, who were consecutively admitted to one of five adult ICUs at UCSF, over a 31-day period. These patients generated more than 2.5 million monitor alarms, including those set as inaudible text messages. There were more than 380,000 audible alarms, producing an audible alarm burden of 187 alarms per bed per hour.

Nurse scientists carefully annotated a subset of 12,671 arrhythmia alarms as true or false; 11,251 were determined to be false. In other words, 88.8% of six potentially lethal arrhythmia alarms (asystole, pause, ventricular fibrillation, ventricular tachycardia, accelerated ventricular rhythm, ventricular bradycardia) triggered false positives. The investigators concluded that a complex interplay of factors contributed to the exceptionally high number of false alarms, including inappropriate user settings, patients' conditions, and deficiencies in computer algorithms. A description of the study has been published in the peer-reviewed open-access journal, PLOS ONE (Drew, Harris, Zègre-Hemsey, et al, 2014).

At the November 2014 American Heart Association (AHA) Scientific Sessions conference, Harris presented preliminary study findings of patient characteristics associated with false arrhythmic alarms. She found that a patient's state of confusion and age (60 and above) were associated with a high number of false alarms. She noted that heightened confusion and older age were statistically correlated.

“Our study really validates what has been known in an anecdotal way, but has not been systematically examined prior to this work; specifically, that a confused or agitated patient may generate numerous false alarms,” Harris said. “We examined a number of patient factors as potential contributors to alarm errors, and we did not find any false alarm association with tremors, recent history of tobacco smoking, or body mass index – either thin or obese.

The AHA presentation also described an association between false alarms and mechanically ventilated patients.

“This surprised us because patients who are mechanically ventilated tend to be sedated,” Harris said. “We were not expecting them to produce many false alarms.”

A detailed report of these study findings is in preparation for publication this fall.

While working in the intensive care unit at Mad River Community Hospital in Arcata, CA, Harris embarked on obtaining her graduate nursing education. She received a masters’ degree from California State University, Sacramento in 2006 with a clinical specialty in adult health and an emphasis in teaching. After receiving her PhD in Nursing from UCSF in June 2012, she worked on the alarm study at her alma mater for two years, as a professional researcher and faculty member. She currently serves on the National Coalition for Alarm Safety, an initiative of the Foundation for the Association for the Advancement of Medical Instrumentation’s Healthcare Safety Technology Institute.

Harris joined Dominican last year to teach advanced medical-surgical nursing to students in the classroom and clinical setting. Her areas of expertise include cardiac and pulmonary nursing in a critical care setting. She is delighted to be part of the Dominican community.