

Rethinking hospital alarms

May 27 2016

Hospital alarms are currently ranked as the "top medical technology hazard" within the United States. On average, there are about 480,000 patients in hospitals—each generating about 135 clinical alarms per day. But studies show that more than 90 percent of these alarms result in no action. Alarm errors—either alarms that sound and receive no response or alarms that fail to sound when they should —occur roughly 8 million times per day.

During the Acoustical Society of America's Spring 2016 Meeting, May 23-27, in Salt Lake City, Ilene Busch-Vishniac, an acoustical consultant, will present a model that predicts how often alarm errors will occur based on several recent studies of hospital alarms.

The error model she developed is rudimentary—either alarms [sound](#) or they don't.

"In each case, alarms reflect a medically urgent situation or they don't," she explained. "For each situation, the response is either appropriate or inappropriate. This means there are eight possible scenarios associated with alarms, so we can estimate how often each occurs and how often errors occur."

In current studies, "the fraction of alarm errors reported as adversely affecting patients is extremely low," said Busch-Vishniac. "But alarms often don't serve the purpose for which they're intended: to alert medical staff to urgent situations. Instead, alarms go off all the time and rarely indicate truly urgent situations. And while the focus has been on

ensuring that the hospital staff responds to all alarms, studies show that it's more common for alarm errors to occur because alarms that should sound fail to do so. This means that responding to all alarms won't eliminate most alarm errors."

There's also concern that alarms within hospitals have a negative impact on patient recovery, she pointed out, although insufficient data is available at this time to really answer the question.

Since 2014, hospitals within the U.S. are required to develop and review their alarm management policies on a regular basis.

"Our work suggests that it's time to rethink alarm strategies entirely—with a goal of reducing the number of alarms to those that truly reflect urgent situations, while balancing the need to alert staff with the need to establish quieter hospital environments," she added.

Busch-Vishniac has outlined an "alarms of the future" research program she intends to pursue.

"The first task is to compare the medical outcomes of patients when alarms sound within their area vs. when alarms are intentionally muted and sent to staff via pagers or cell phones," she said. "This will help to establish whether alarms potentially harm patients, as well as save lives. We'll also explore when alarms should sound, which sounds should be used, and ways to make alarm systems more intelligent by combining information from multiple medical devices."

Her goal is to design optimum alarm systems for hospitals that can be integrated into hospital equipment within 20 years.

More information: Presentation #5aAA8, "Death by alarm: An error model of hospital alarms," by Ilene Busch-Vishniac will take place on

Friday, May 27, 2016, at 9:50 AM MDT in Salon I. The abstract can be found by searching for the presentation number here:<http://acousticalsociety.org/content/spring-meeting-itinerary-planner>

Provided by Acoustical Society of America

Citation: Rethinking hospital alarms (2016, May 27) retrieved 25 April 2024 from <https://medicalxpress.com/news/2016-05-rethinking-hospital-alarms.html>

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