Actionable alarm or crying wolf? Johns Hopkins safety team honored for reducing clinical alarms

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An independent, nonprofit institute that conducts research about and assesses best practices in patient safety and quality has given one of its premier awards to a group of Johns Hopkins nurses, physicians and engineers that significantly reduced the number of distracting, non-critical bedside alarms in some of the hospital's noisiest areas.

ECRI Institute, which labeled clinical alarms the number one health technology hazard of the year, awarded The Johns Hopkins Hospital (JHH) its Health Devices Achievement Award for 2012.

"Johns Hopkins has set an excellent example for how a methodical and carefully analyzed research process can be applied to alarm management and result in a significant improvement in patient care," says James Keller Jr., M.S., vice president, health technology evaluation and safety at ECRI. "This project has created an excellent roadmap for other health care organizations working to improve safety with clinical alarms."

"In health care we have created the perfect storm with all of these monitoring devices," says Maria Cvach, M.S.N., R.N., CCRN, assistant director of nursing clinical standards at JHH, and leader of the hospital's alarm improvement efforts since 2006. "Monitor alarm systems are set to be very sensitive and unlikely to miss a true event but result in too many false positives."

Baseline measures revealed the scope of the challenge for JHH's Alarms Management Committee: One 12-day alarm system analysis registered 58,764 alarms, an average of 350 per patient per day. That rate was doubled on the noisiest unit, and analysis revealed a 90 percent false-positive rate among alarms in the pediatric intensive care unit set on monitors for apnea, a breathing lapse.

In addition to noise reduction, the quality-improvement project sought to prevent "alarm fatigue," potentially hazardous conditions that arise when nurses and other caregivers become so desensitized by frequent, unnecessary crisis alarms that they become less likely to respond. "Frequent alarming can cause a 'cry-wolf' effect," Cvach explains.

By collecting baseline measurements, defining and validating appropriate alarm settings, and working with each unit to develop an alarms improvement plan, the multidisciplinary team safely reduced the cacophony from monitors, infusion pumps, ventilators, bed exit systems and other bedside devices, hospital-wide. Reductions ranged from 24 to 74 percent across six units.

In another pilot study, the researchers cut in half the total number of alarms by asking nurses to change patients' monitor electrodes daily.

"Patients and staff need a quiet environment," explains Andrew Currie, M.S., CBET, Hopkins' director of clinical engineering. He co-chairs the alarms committee with Cvach and Adam Sapirstein, M.D., a faculty member in Johns Hopkins' Armstrong Institute for Patient Safety and Quality. "We are trying to reserve noisy alarms for the most important, actionable events," Currie says. In some cases, units switched some lower-priority alarms to visual rather than auditory notifications.

Cvach and Sapirstein say that partnering with leaders on each unit was essential to their success, because improvements needed to be tailored to individual settings. "A one-size-fits-all approach would not have received the kind of support we needed to address this problem," he says.

Before setting out to alter alarm settings, the committee analyzed and rated each alarm based on importance and risk to ensure back-up notification systems were in place for the most critical alarms. "For high-priority alarm conditions, redundancy is important. Our units need multiple ways to assure audibility of alarm signals and patient safety," Cvach says.

The group's other efforts include testing new equipment, assessing alarm management alternatives, developing new policies, creating and assessing training efforts and considering new alarm technologies.

A current pilot study is testing a system that sends messages about priority alarms to cell phones and pagers carried by nurses, who, with the press of a button, can call for back-up if they're unable to respond. Another initiative that Sapirstein is leading will look into "smart alarm" systems that integrate data from multiple machines, and predict problems before they occur.

ECRI Institute will present the Alarms Management Committee and Hopkins Hospital leadership with the seventh annual Health Devices Achievement Award in an October 25th ceremony on the East Baltimore campus.

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