Why Clinical Alarms are a “TOP TEN” Hazard

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An Alarming Challenge

- More and more devices with alarms
- More and more patients are connected to one – or many alarm-based devices
- 150-400 alarms per patient per day can be typical in a critical care unit
- Alarm-based devices are not standardized in many institutions
- Flexible alarm setting features allow for inconsistent use of alarms
The Consequences are Alarming

"Alarm fatigue" blamed in hospital deaths
Boston Globe probe: More than 200 linked to alarms in past 5 years, many because so many go off, nurses often ignore them

And Routinely in the News

“Alarm Fatigue” a Concern for New Haven Hospitals. New Haven Register, June 11, 2011
A Typical Event

“Patient admitted with chest pain and shortness of breath---Was on a monitored unit. At 3:25 am, patient’s nurse noticed the leads were off and on checking on the patient found him in the bathroom unresponsive. Resuscitation efforts were unsuccessful. Monitor showed the leads had come off at 2:32 am …”

ECRI Institute’s search of FDA Maude database using “alarm” and “death” revealed 216 deaths involving physiologic monitor alarms (Jan 2005 - Dec 2010)

- In 73 of the cases, alarms sounded, but staff silenced them, did not hear them because the volume was too low, or did not respond for another reason

- The *Boston Globe* reported on at least 15 alarm-related deaths in Massachusetts over the last six years. (February 13, 2011)
Pennsylvania Patient Safety Authority reports:
35 deaths associated with physiologic monitor alarms (June 2004-Dec 2010)

- 28 involved staff failure (e.g., inadequate response, alarms silenced)
- 28 specific to telemetry monitoring
- 14 involved equipment not connected
- 14 communication problems
- 14 distractions/interruptions
Updated from Earlier Research

12 Deaths

Connecting Remote Cardiac Monitoring Issues with Care Areas.
National Alarm Survey

- Healthcare Technology Foundation
  - www.thehtf.org
- 4,278 healthcare professionals surveyed
- Covered perceptions, issues, suggested improvements, and priorities
- Major contributors were respiratory therapists and nurses (93% respondents clinical staff)
- Nuisance alarms disrupt patient care
  - 71% agree or strongly agree
Other “Top Ten” Considerations

- Routine ECRI Institute accident investigations – in a variety of settings
- ECRI Institute surveys
- Some estimates suggest that the actual number of alarm-related deaths is actually ten-fold higher than what problem data shows
- A complex problem to solve
- The “front page” factor
Typical Case of Alarm Fatigue

- Ventilator-dependent patient – frequent coughing
- Coughing triggers high-pressure alarm
- Frequent response to alarm by nurse with no real problem
- Pressure alarm limit increased to minimize the number of false-positive alarms
- An accident waiting to happen
  - Patient movement crimps breathing circuit
  - Secretions clog the endotracheal tube
  - Inadequate ventilation (inhalation or expiration)
Some Questions to Ask

- Does the nurse understand the purpose of the high-pressure alarm?
- Was the nurse’s competence in ventilator use validated?
- Does the hospital have a policy for who can and cannot set ventilator alarms?
- Is there a policy on how ventilator alarms should be set?
  - If so, is it generic or does it consider specific circumstances?
My Own Alarm Fatigue

https://www.ecri.org/blog/Lists/Posts/Post.aspx?ID=140
https://www.ecri.org/blog/Lists/Posts/Post.aspx?ID=143
Device Evaluation Perspectives

- Turning off the alarm at the central station
- Very low volume settings
- Alarm escalation not available
- For a silenced alarm condition – no reminder that it has been silenced
- Inconsistency within the same product line regarding the same alarm function (e.g., for silencing)
Goals for Improvement

- Minimize patient safety vulnerabilities
- Reduce risk
- Improve the efficiency of alarm notification and response
- Improve the efficacy of alarm management
- With buy-in from all stakeholders
- Support technology improvement/advances
Example Scenario

32-bed step-down area with alarm integration system: all patients’ alarms sent to all nurses’ pagers

→ Alarm Fatigue Underlying Causes

▶ Diffuse responsibility for alarm response
▶ Assumptions that someone else will respond
▶ No alarm escalation plan
Example Solution

- Delineate responsibility for alarm response
- Develop an alarm escalation plan
  - Who receives initial alarm notification for each type of alarm
  - Who receives back-up alarm notification for each type of alarm
  - Time intervals per escalation
THANK YOU