Alarm Fatigue Attitudes and Alarm Management Tools Hospitals Want/Need: Results from First National Survey of Patient-Controlled Analgesia Hospital Practices
Disclosure

Support for website and some activities:

• AccelRx
• CareFusion
• Covidien
• Incline Therapeutics
• Massimo
Agenda

1. What’s the Problem?
2. Why We Should Care?
3. How We Can Address the Issue?
What’s the Problem?
Work-Flow Interference & Adverse Events

Hospital staff experiencing
“Alarm Fatigue”
- Overwhelmed by information
- Desensitized to number of alarms
- Immune to alarm sounds

Improper responses
- Turn down volume
- Turn alarms off
- Adjust settings outside safe limits

Serious or fatal consequences
- Patient falls
- Delays in treatment
- Treatment errors

What’s the Problem
Average 350 Alarms per Bed per Day

Sample from Johns Hopkins Hospital ICU

<table>
<thead>
<tr>
<th>12 Day Sample of Alarm Data</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Priority</td>
<td>1587</td>
</tr>
<tr>
<td>Medium Priority</td>
<td>6673</td>
</tr>
<tr>
<td>Low Priority</td>
<td>48277</td>
</tr>
<tr>
<td>Technical Alarms</td>
<td>2227</td>
</tr>
<tr>
<td>Grand Total of Alarms</td>
<td>58764</td>
</tr>
<tr>
<td>Ave Pt Census</td>
<td>14</td>
</tr>
<tr>
<td>Average Alarms/Bed/Day</td>
<td>350</td>
</tr>
</tbody>
</table>
What’s the Problem?
Alarm-Related Deaths (voluntary reports)

The Joint Commission’s Sentinel Event database (January 2009 - June 2012):
• 98 alarm-related events
• **80 resulted in death**
• 13 in permanent loss of function
• 5 in unexpected additional care or extended stay

U.S. Food and Drug Administration’s (FDA) Manufacturer and User Facility Device Experience (MAUDE) database (January 2005 - June 2010)
• **566 alarm-related patient deaths**
What’s the Problem?
Alarm-Related Deaths (voluntary to all incidents)

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Voluntary reports, under represent the actual number of incidents (research shows total actual number between 300 - 1,000 voluntary reports)


Estimated patient deaths:
• Total: 29,400 - 98,000
• Per Year: 8,400 - 28,000
• Per Month: 700 - 2,333

Estimated patient deaths:
• Total: 169,800 - 566,000
• Per Year: 30,873 - 102,909
• Per Month: 2,573 - 8,576
What’s the Problem?
Monitor-Related Deaths

2005-2006 Alarm Related Death by Device
FDA MAUDE DATABASE

Kathy Weil, MS, BSN, RN
Nurse Consultant
CDRH/FDA
Clinical alarm systems are intended to alert caregivers of potential patient problems, but if they are not properly managed, they can compromise patient safety.

Requirements:
- As of July 1, 2014, leaders establish alarm system safety as a [critical access] hospital priority
- During 2014, identify the most important alarm signals to manage

Why We Should Care?
Joint Commission National Patient Safety Goal
Why We Should Care?
ECRI Top Technology Hazard

“Excessive numbers of alarms—particularly alarms for conditions that aren’t clinically significant or that could be prevented from occurring in the first place—can lead to alarm fatigue, and ultimately patient harm. That is:

• Caregivers can become overwhelmed, unable to respond to all alarms or to distinguish among simultaneously sounding alarms.

• They can become distracted, with alarms diverting their attention from other important patient care activities.

• They can become desensitized, possibly missing an important alarm because too many previous alarms proved to be insignificant.”
Why We Should Care?
One Patient is One Too Many

17-Year Old Dies After Alarm Muted
Why We Should Care?
One Patient is One Too Many

17-Year Old Dies After Alarm Muted

- recovering after successful tonsillectomy
- to manage pain, administered a dose of fentanyl
- continuously electronically monitored
- BUT: nurse admitted that monitors muted for sound
- SETTLEMENT: $6 million

How We Can Address the Issue?
Improving Alarm Management Requires a System’s Approach
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Improving Alarm Management Requires a System’s Approach

Alarms Management is Complex

- Staffing Patterns
- Care Model
- Patient Population
- Culture
- Delineation of Responsibility
- Alarm Coverage Model
- Architectural Layout
- Technology Capabilities & Configuration
- Ancillary Technology

National Survey & Technological Wants/Needs

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How We Can Address the Issue?
About the National Survey

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This survey was conducted during March & April 2013*. Respondents include...

- **168 Respondents**
  - 18% Physicians
  - 35% Non-Physicians (Nurses, R.T.s)
  - 47% Pharmacists

- Hospitals from across **40 States**

- Institution Type
  - Non-Teaching **45%**
  - Teaching **55%**

- Hospital Size Range
  - 14 # of beds
    - Median = 200
  - 1,500+

*Data source: National Survey on Hospital Pharmacy Practice and Education.
How We Can Address the Issue?
95% Concerned About Alarm Fatigue

More than 19 in 20 hospitals (95.1%) say they are concerned about alarm fatigue.

How would you rate your concern about potential alarm fatigue about continuous electronic monitoring?

- Concerned that it will be a problem that is difficult to manage or is preventing us from implementing: 33.73%
- Concerned but don’t believe it will be an unmanageable problem: 61.4%
- Not concerned at all: 4.90%
How We Can Address the Issue?
Alarm Fatigue Interferes with Patient Safety & Exposes Patient to Potential Harm

If No Alarm Fatigue, More Hospitals Would Monitor
Almost one in ten hospitals (87.8 percent) believe that a reduction of false alarms would increase the use of patient monitoring devices, like an oximeter or capnograph.

9/10 HOSPITALS BELIEVE REDUCING FALSE ALARMS WOULD INCREASE USE of PATIENT MONITORING DEVICES (i.e. OXIMETER or CAPNOGRAPH)
Of those hospitals that monitor some or all of their patients with pulse oximetry or capnography, more than 65 percent have experienced positive results -- either in terms of a reduction of overall adverse events or of costs and expenses. The other 35 percent of those that monitor say it is “too early to determine or have not determined.”

Those using smart pumps with integrated end tidal monitoring were almost three times more likely to have had a reduction in adverse events or a return on investment in terms of a reduction in costs and expenses (OR=2.789; 95% CI 1.112-6.996).
How We Can Address the Issue?
Need/Want for Single Assessment Indicator
How We Can Address the Issue?
Assessment Recommendations & Training

**Recommendations:**
44.6% would like “recommendations on how best to easily make such assessments” of patients

**Clinical Training:**
52.9% would like to see more clinical training
How We Can Address the Issue?
Technological Alarm Awareness Wish List

➡ Single Assessment Indicator:
  Multi-parameter alarms vs single parameter to improve alarm specificity and decrease the false alarm rate

➡ Standardize Alarm Sounds:
  Standardization of alarm sounds across similar devices (all vents sound the same, all monitors have the same sounds, etc)

➡ Pause Before Alarming:
  Slight delays to eliminate nuisance alarms that auto-correct – example ST alarms delayed by 2 minutes prior to sending an alarm

➡ Electrode/Skin Interface:
  Simple way for staff to determine if electrode/skin interface is good

➡ Escalation of Alarm Levels:
  Escalation of alarm levels based on quantity/or change in alarm pattern (i.e. patient has a sudden increase in the number of PVCs; HR suddenly goes down from 90s to 60s)

➡ “Smarter” IV Pumps:
  IV pump that can be smart enough to know when a critical med is infusing and alarm sound is different and more urgent

➡ Device Interoperability:
  Interoperability among multiple devices

➡ Alarm Integration:
  Ancillary notification system that integrates all alarms within the patient room to a single device (highly accurate; no more than 3-4 alerts/hour)

➡ Multi-Function Wireless Device:
  Wireless device that is reliable, not heavy, can do multiple functions (barcode, wifi, text, phone, good battery life, few dropped calls, easy alarm escalation and alarm acknowledgement)

Courtesy: Maria Cvach, DNP, RN, CCRN (Assistant Director of Nursing, Clinical Standards, The Johns Hopkins Hospital)