Quite Alarming!
Implementation of Alarm Management Strategies to Reduce the Incidence of False Alarms

Objectives
- Describe the impact of alarm fatigue on patient outcomes
- Implement evidenced-based practice alarm management strategies to improve patient safety

Team Work with RN(s) next to you
- Quickly introduce yourself, your role, and where from.
- Next, together count how many alarms you can think of in the hospital.
- Who came up with the most??

Alarm Definitions
- An anxious awareness of danger
- A sudden fear or distressing suspense caused by an awareness of danger; apprehension; fright
- Any sound, outcry, or information intended to warn of approaching danger
- An automatic device that serves to call attention, to rouse from sleep or to warn
- A warning sound; signal for attention
- A warning of existing or approaching danger

Alarm Definitions Themes
- An anxious awareness of danger
- A sudden fear or distressing suspense caused by an awareness of danger; apprehension; fright.
- Any sound, outcry, or information intended to warn of approaching danger
- An automatic device that serves to call attention, to rouse from sleep or to warn
- A warning sound; signal for attention
- A warning of existing or approaching danger
**Medical Alarm Statistics**

- In 1983, there were an average of 6 different medical alarm types
- As of 2011, the average number increased to 40
- Estimated: 80-99% of alarms heard today do not require clinical intervention
  - Alarm conditions set too tight
  - Default settings are not adjusted for the individual patient
  - EKG electrodes are dry or mispositioned

**Alarm Fatigue**

the most common contributing factor

**What is alarm fatigue?**

- Alarm fatigue is sensory overload caused by exposure to an excessive number of alarms
- This leads to the nurse or monitor tech becoming desensitized to alarms causing
  - delayed response time
  - ignored alarm assuming it's fake

**Joint Commission published Sentinel Event Alert #50 in April 2014**

The Joint Commission's Sentinel Event Alert #50 is a tool to help organizations identify and address alarm fatigue through a collaborative, interdisciplinary approach. The alert emphasizes the importance of monitoring alarm events, understanding the root causes of alarm fatigue, and implementing strategies to reduce unnecessary alarms and improve patient care. The Joint Commission encourages healthcare providers to use this alert to foster conversations with key stakeholders, including physicians, nurses, technicians, and other team members to develop action plans that address the specific challenges in their settings. The goal is to enhance patient safety by ensuring that alarms are used effectively and efficiently to support clinical decision-making.
Joint Commission 2014 NPSG

- Manage clinical alarm systems that have the most direct relationship to patient safety
- Phased-in between 2014 and 2016
- 2015: Reduce the harm associated with clinical alarm systems
- By 2016 all organizations to have clear-cut guidelines for managing alarms
  - Clinically appropriate settings for alarms
  - When alarm can be disabled
  - When parameters can be changed
  - Who has the authority to set, change or turn off alarm parameters
  - Monitoring and responding to alarms
  - Checking individual for accurate settings, proper operation, and detectability

Unit Gap Analysis—Strategies for Managing Alarm Fatigue

The purpose of the project was to improve patient safety and reduce alarm fatigue by decreasing the incidence of false alarms for a central telemetry monitor station.
We used tally marks when collecting the data then typed them into an excel file to analyze the

data. Sample of Data Collection Tool

<table>
<thead>
<tr>
<th>Event</th>
<th>True alarm</th>
<th>False alarm</th>
<th>No. of events</th>
<th>Event</th>
<th>True alarm</th>
<th>False alarm</th>
<th>No. of events</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACME</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
<td>ACME</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
</tr>
<tr>
<td>LINX</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
<td>LINX</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
</tr>
<tr>
<td>CAR</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
<td>CAR</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
</tr>
<tr>
<td>VICX</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
<td>VICX</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
</tr>
<tr>
<td>UX</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
<td>UX</td>
<td>34 30 02</td>
<td>32 24 01</td>
<td>34 30 02</td>
</tr>
</tbody>
</table>

These alarms do not record on the monitor. To get these alarms, someone would need to sit at
the monitors and count them as they hear them – very time consuming!

Our data does not include blood pressure, SpO2, leads off alarms or any advisory alarms

These alarms do not record on the monitor. To get these alarms, someone would need to sit at
the monitors and count them as they hear them – very time consuming!
The non-cardiac units had just over half of their alarms compared to only roughly the same amount of true and false alarms per patient. The CVICU was again the only unit to have more true alarms of a patient compared to only 5 false alarms.

Data was collected from 57 patients from both cardiac and non-cardiac patient floors.

Central Telemetry Monitoring Station

Station is able to watch up to 62 patients at any given time.

Time frame of 48 hours for data collection: 24 hours of data per patient.

Fall 2010 – Winter 2011 CVICU had done some alarm management based on this article.
Central Monitor Station
One alarm at least every 2.5 minutes
- Excludes BP, SpO2, leads off, and advisory alarms

ST False Alarms for SC
The data was collected on SC over a 3 day period. There were a total of 103 ST false alarms in that time.

How Can We Decrease the Incidence of False Alarms?
Over 30% of Alarms in both groups were false!

What Were the False Alarms?
Biggest Culprits of False Alarms were couplets and ST Segment.
All ST Segment alarms were false!

How do We Decrease the Number of False Alarms?
Interventions

- Adjust Alarms (this was implemented first)
- Changed couplet and ST segment alarms to message
- Adjusted alarms to specific patients

Parameter Adjustment Guideline
Alarm HI & LO limits

- We do not want to turn off alarms, however inappropriate alarms may desensitize us and lead to delayed response or poor outcomes
- Alarms that we are not treating should be adjusted.
  - For example:
    - CVICU had 34 true alarms in two hours for Atrial Fibrillation rate > 150. Alarm level should have been adjusted to 7/2 tspm until the HR decreased as a response to the medicine.
    - HR drops to occasionally to frequently drops to 48 from 55.
    - HD order to call for HR < 45. Adjust the rate to 45
    - CVICU and HT should review and adjust the alarm limits at the beginning of the shift and pm.

Parameter Adjustment Guideline
ST analysis

- CVCU
  - Individual the upper limits per the ST segment blueprint
  - For example if the ST elevation is 2.3, increase the limit to 3
  - When walking patient with telemetry turn ST to message so it does not alarm
  - Review the ST blueprint
  - 100% pacing. ST analysis is inappropriate. Turn off

- SC
  - Current process, ST limits cannot be adjusted (default to -2 to +2)
  - Biomed changed the default alarm to message rather than advisory. This instead of one beep, no noise will occur – just a message across the screen
  - Patients who are rule out MI, you may want to consider turning it to advisory – this can be done in the room.

Parameter Adjustment Guideline
Couplets

- CVICU
  - No change. Couplet alarm default to message
- SC
  - Biomed changed the default alarm to message rather than advisory. Thus instead of one beep, no noise will occur – just a message across the screen
  - The couplet alarm frequently alarmed due to artifact
  - VT > 2 is still warning so we will capture if there is a problem

E-Learning Education Module
Change Alarms to Messages

- Studies have shown that changing alarm default settings and customizing alarms can decrease the number of false alarms
- Customize alarms to meet the needs of individual patients
- Change alarms within 1 hour of patient admission
- Changing alarms to message may decrease the number of false alarms by displaying a message rather than sounding a tone

Post Data Alarm Changes
WOW!

- Changing Couplets and ST to message, we decreased 423 alarms at 5 C central station in 48 hours

Number of Alarms for Couplets & ST Segment Pre & Post Data 2013
However...

- False VT/VF alarms are now the #1 cause of false alarms

Next step to decrease more false alarms...

Are we following the guidelines?

Monkey survey CVICU & SC RNS

AACCN Practice Alert

Scope and impact of the problem

- Achieving more accurate startup settings to improve patient care. The goal is to reduce false alarms by improving the accuracy of the settings. This will help ensure that the alarms are triggered only when necessary, thereby reducing the number of false alarms.

AACCN Practice Alert

Survey results show:

- 32% of clinicians reported false alarms
- 28% of clinicians reported missed alarms

Expected outcome and learning outcomes:

- Clinicians will be able to set up more accurate alarm parameters.
- Clinicians will be able to reduce false alarms and missed alarms.

When applying electrodes for EKG monitoring, how often do you prep your patient's skin?

- Routine Prep: 6% (Skip to 6)
- Sensitivities: 21%
- Conspicuity: 7%

How often do you customize your alarms or adjust your parameters?

- Rarely: 6%
- Occasionally: 40%
- Frequently: 54%

Note: Survey was done at the beginning of the project before education.
How often do you change the electrodes?

- Nearly
- Occasionally
- Daily
- Frequently

(For CVICU RNs only) In your perception, do you notice a lot of false alarms?

- Nearly
- Occasionally
- Daily
- Frequently

Interventions

- Adjust Alarms (this was implemented first)
- Changed couplet and ST segment alarms to message
- Adjusted alarms to specific patients
- Skin Prep for lead placement
  - This was only done 4% of the time prior to change

Skin Prep for lead placement

- Proper skin preparation before ECG electrodes are placed decreases skin impedance and signal noise, thereby enhancing conductivity.

- Skin prep techniques
  - Wash skin with soap and water
  - Remove excess hair
  - Roughen skin with abrasive washcloth or sandpaper

Skin Prep Guideline

- Use dry wash cloth to dry the electrode area

Many of our false alarms were due to artifact that the monitor picked up as VT/VF or couplets.

Process Change

- For direct admits, with admission packet/supplies take two
  - Wash the electrode area with soap and water
  - Use dry wash cloth to dry the electrode area
  - Apply electrode
  - Do not use both wipes due to the skin
  - Avoid using alcohol as it can dry out the skin. May use alcohol for oily skin
  - For ED patients - if you are getting a good reading without artifact, no need to change electrodes.
Continued Artifact/False Alarms Skin Prep Step 1

- When the MT notices continued artifact causing false alarms, the RN or CNA will be notified to do a skin prep and change electrodes.
- Date the new electrodes with a marker.

Skin Prep Step 3

- Use brush/scrub to gently abrade without electrode areas.
- Apply electrode to prepped skin.

Electrodes

- Even though the guideline states to change electrodes daily, we have chosen not to implement this at the present time.
- We want to see if skin prep is all we need and also we are concerned with skin tears.
- However, change electrodes for increased artifact

Misc

- To decrease noise, the EKG monitor alarm volume in the 5C rooms has been defaulted to 20% rather than 40%.
- When patient leaves 5C (including cath lab):
  - Notify MT; patient is leaving the floor
  - Pause the monitor in the room so it does not alarm
  - When patient returns, call MT so a post-procedure strip can be run.

Summary of changes

- Skin prep prior to electrode placement
- Change couplet alarm to message
- Change ST alarm to message
- Adjust inappropriate alarm limits

Outcomes

- 159 decrease in false alarms by with 1st intervention of changing ST and couplet alarms to message
- An additional 124 decrease in false alarms with the 2nd intervention of doing skin prep before lead placement
Conclusion

- Implementation of two aspects of the AACN Practice Alert on Alarm Management reduced false alarms by 283 alarms and the average number of false alarms per patient by 5 alarms in 24 hours.
- Data should be collected again to determine next steps to continue to decrease false alarms to prevent alarm fatigue and potential harm to patients.

Next?

False alarms decreased by an average of 5 per patient in 24 hours at a central monitor station that can monitor up to 62 patients at a time.
- Thus the potential to have 310 less false alarms in 24 hours!
Seven Monitor Stations
- CVICU
- ICU
- ICU – Proctor
- 5C – Progressive
- 2P – Telemetry
- ED
- ED - Proctor

UnityPoint Health Peoria Report
February 5 – 11, 2015

Total Monitor Alarms both campuses for one week = 147,447

- 2P – Proctor = 4,506
- 5C – Methodist = 16,057
- CVICU – Methodist = 38,376
- ICU – Methodist = 23,799
- ED – Methodist = 33,507
- ED – Proctor = 9,883
- ICU – Proctor = 21,319
Recommended changes - approval

Parameter Alarms

Do you know any patients who have died because of a hospital protocol? Is it okay, why is it set to alarm?

SpO2 decreased to 88-89%

If not treating it,

Note – we had inconsistent alarms

Technical Alarms

Possible change to disposable SpO2 probe

Check the newness of the electrodes

Note – we had inconsistent alarms

settings between the units
Joint Commission and AACN Practice Alert

- Alarms that are not treated should be adjusted to prevent alarm fatigue

References