ALARM MANAGEMENT & BEST PRACTICES

History of Alarms

- The word alarm originates from the Latin ‘ad arma’ or French ‘a l’arme’ which translates to ‘to your weapons’
- Some of the first documented alarms dates back to the Middle Ages
- An alarm is a warning that results from a measurement variance and indicates a deviation from normal state
- Alarms are essential and necessary in the monitoring of vital signs necessary to support life
- The word ‘alarm’ indicates a call for immediate action or defense
- Alarms are intended to prevent patient harm by providing rapid reaction to critical situations **BUT** only if they are not false alarms

ALARM FATIGUE

Clinicians become desensitized, overwhelmed or immune to the sound of an alarm

What is Alarm Fatigue?

Alarm fatigue is the direct result of the constant bells, blips and alarm signals emitted by medical devices

Care givers may become 'immune' to these sounds which increases the risk of these alarms being absorbed into the auditory landscape of hospital corridors and subsequently being ignored[2]

Fatigued Clinicians May:

Turn down alarm volume

Turn off alarm

Adjust alarm settings

These actions can have serious or fatal consequences

Alarm Fatigue

Hazard Faced by Hospitals

"In a hospital setting, the frequency of alarms poses a risk of some hospital staff becoming **desensitized** to the constant beeps and in the worst cases, **lowering the volume too much**"

- ECRI Institute

Patient Safety Issue

The Joint Commission

Sentinel Alert: (OAKBROOK TERRACE, Ill. – April 8, 2013) The constant beeping of alarms and an overabundance of information transmitted by medical devices such as ventilators, blood pressure monitors and ECG (electrocardiogram) machines is creating "alarm fatigue" that puts hospital patients at serious risk, according to a *Sentinel Event Alert* issued Today by The Joint Commission.

2016 TOP 10 HEALTH TECHNOLOGY HAZARDS
ECRI Institute

#2

Missed Alarms Technology Hazard

Missed Alarms Can Have Fatal Consequences!

The Joint Connection

The Scope of the Problem

Medical Device Alarm Safety

⚠ **85-99%** **of alarm signals** don't require clinical intervention

The Joint Connection

Patient Events

*The reporting of most sentinel events to The Joint Commission is voluntary and represents only a small portion of actual events. Therefore, these data are not an epidemiologic data set and no conclusion should be drawn about the actual relative frequency of events or trends in events over time.

National Patient Safety Goals on Alarms

The Joint Commission Announces 2014 National Patient Safety Goal In June 2013

PHASE 1

(2014 to January 1, 2016)

Establish alarm system safety as hospital priority

Identify most important alarm system to manage (EC.02.04.01)

PHASE 2

(began January 1, 2016)

Establish policies and procedures for managing the alarms identified

Educate staff and communicate changes

NPSG on Alarm Management – Phase I

NPSG on Alarm Management In Phase I (beginning January 2014)

Establish alarm management as an organizational priority

Identify most important alarms to manage based on internal situations

Seek input from medical staff and clinical departments

Identify risks to patients due to lack of response and/or malfunction

Identify actionable alarms vs alarms contributing to noise/fatigue

Publish best practices/guidelines

Pro-actively think: Identify potential for patient harm based on internal incident history

NPSG on Alarm Management: Phase 2

NPSG on Alarm Management In Phase II (beginning January 2016)

Hospitals were expected to develop and implement specific components of policies and procedures that address at minimum:

- Clinically appropriate settings
- When alarms can be disabled
- When parameters can be changed
- Who can set, who can change parameters, and who can set to "off"
- Process for monitoring alarms and expectations moving forward
- Checking individual alarm signals for accurate settings, proper operation and detectability
- Educate those in the organization about alarm policies
- Clinical Leadership responsible ensuring accuracy, safety, education and communication around new alarm policies

Common Cause for Nuisance Alarms

- Improper lead placement
- Many parameters set to always sound an alarm
- No schedule to change leads
- Multiple **unverified alarms** being routed to nurse pager or phone
- Frayed or malfunctioning lead wires
- Lack of patient education, thus decreased patient compliance with wearing the device
- Alarms not customized
- Alarm defaults still per manufacturer recommendations, not customized to reflect unit/hospital policies

NPSG on Alarm Management: Taking Action

Create or participate in an Alarm Management Committee

Change transmitter batteries daily or when the system indicates the need for them

Stress loops on ECG lead wires for tremulous patients

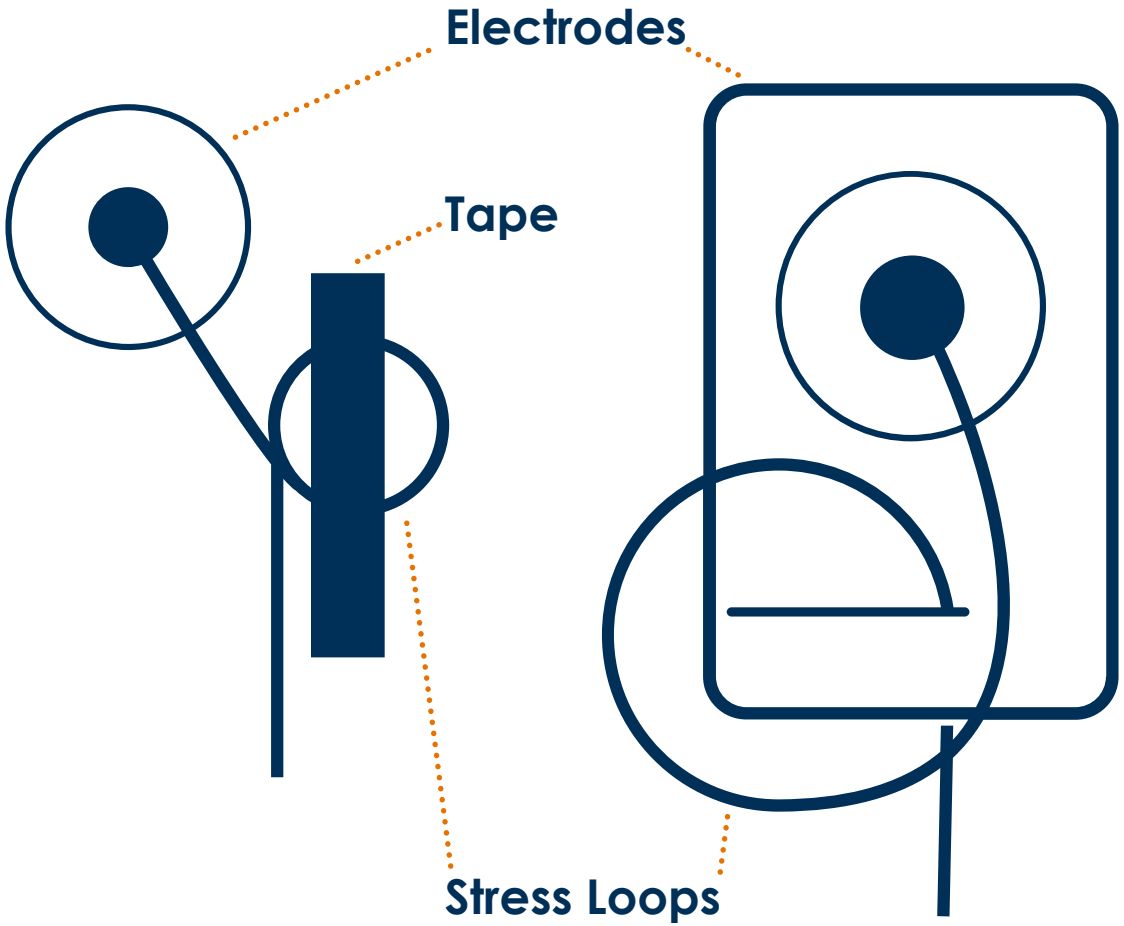
Customize individual patient alarms based on assessment and condition to assure alarms are valid

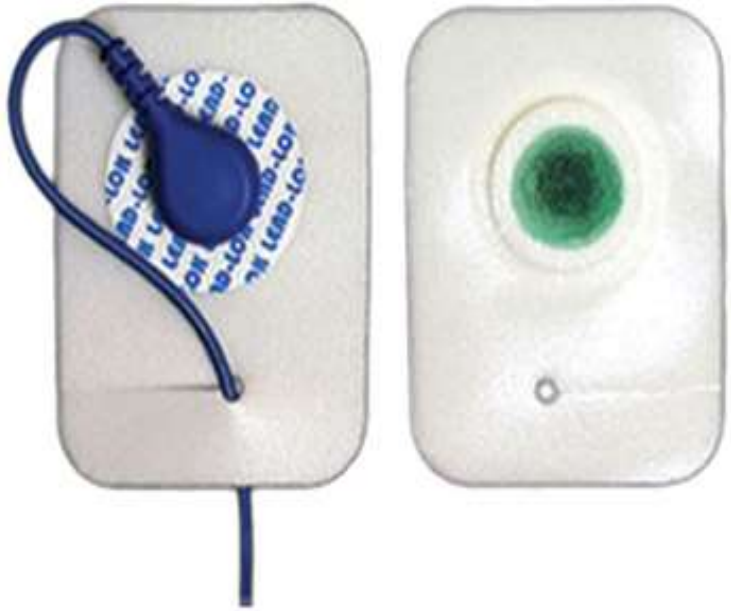
Establish organizational alarm defaults by unit

Customize alarms based on patient assessment and report/verify at shift changes

Change electrodes daily using recommended procedures.
Add this to daily routine tasks such as baths, PM care to assure practice change

Stress Loops for ECG Leads





Best Practices: Alarm Settings

Alarm settings, limits and delays

- Establish appropriate default settings for hospital unit and patient population
- Small changes can yield big results:
  Example: Decreasing Sp02 lower threshold by one point from 90% - 89%
- Turn off **duplicate alarms**
- Consider using **alarm signal delays** to all for alarm autocorrection
- Ensure alarm priority is set to **actionable levels**
- Consider using secondary alarm notification to improve audibility
- Review high/low settings and other limits
- Consider alarm escalation to increase priority

Best Practices: Alarm Settings

Establish alarm limits and defaults based on **population served** (Adult ICU vs NICU vs Emergency Department)

Create a process to customize alarm settings based on **individual patients**

One size **does not fill all**

Staff Education

Educate clinicians on their roles related to alarm management

Empower staff to manage nonactionable alarms by changing limits to actionable levels (in accordance with organizational policy)

Ensure staff are trained and competent in recognizing and troubleshooting equipment alarm signals

Encourage staff to review trend data for repetitive alarms, especially during sleep. A perceived false alarm may be a sleep apnea patient with multiple clinical relevant alarms that self correct when the nurse enters the room and wakes the patient

Best Practices: Alarm Settings

Educate

the patients and families about the physiologic monitoring systems and their role in patients safety and alarm malmanagement

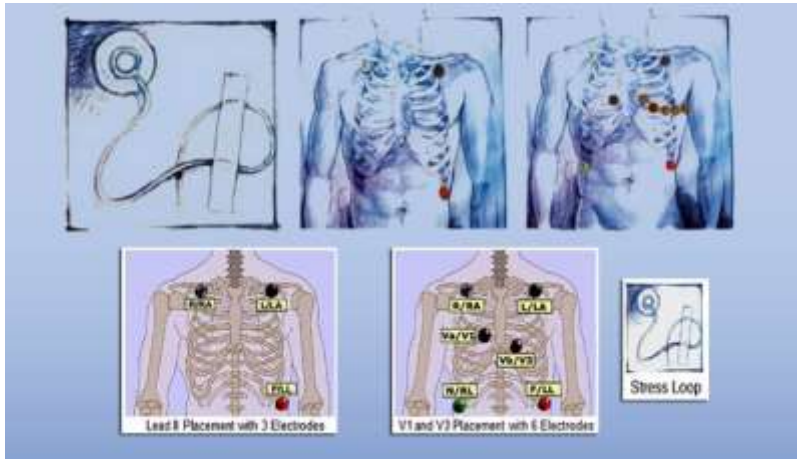
Encourage

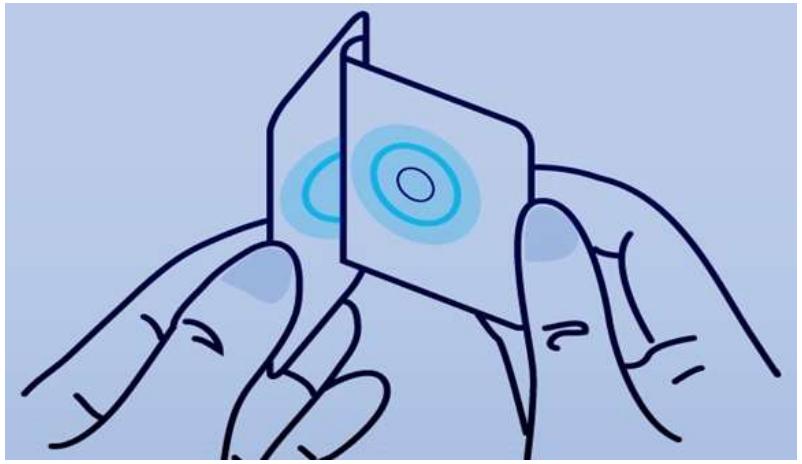
patients and families to notify staff when an alarm signal is not being addressed in a timely manner

Consult

with other hospitals to determine where they have set their default physiologic monitor settings

Best Practices





Waveform Artifact/ECG/SPO2

Review proper skin and electrode prep

Maintain regular schedule for changing electrodes

Inspect re-usable lead wires to assure they are intact, proper connections and frayed wires

Consider use of disposable lead wires and SPO2 probes

Check sensor placemat for adhesion

Stress looping

Smoothing & Time Delays

A large percentage of clinical alarms are caused by only a mild threshold violation

Implementation of time delays on certain parameters have proved to be effective in alarm reduction

Research has shown that a 15 second smoothing algorithm on SpO_2 reduced false alarms by 50%

Smoothing Algorithms - Remove artifact and smooth the vital sign data collected

Program average periods for heart rate/pulse rate (usually 0-10 seconds), SpO_2 and respiration rates (usually 0-30 seconds)

Responding to Notification Systems

Intervene to the Notification in a Timely Manner

Assess the PATIENT When Alarms Occur

Take Action to Correct Patient Problem

Replace probe(s)

Replace/Change Electrodes

Adjust Alarm Parameters

Based on Clinical Assessment and Stability

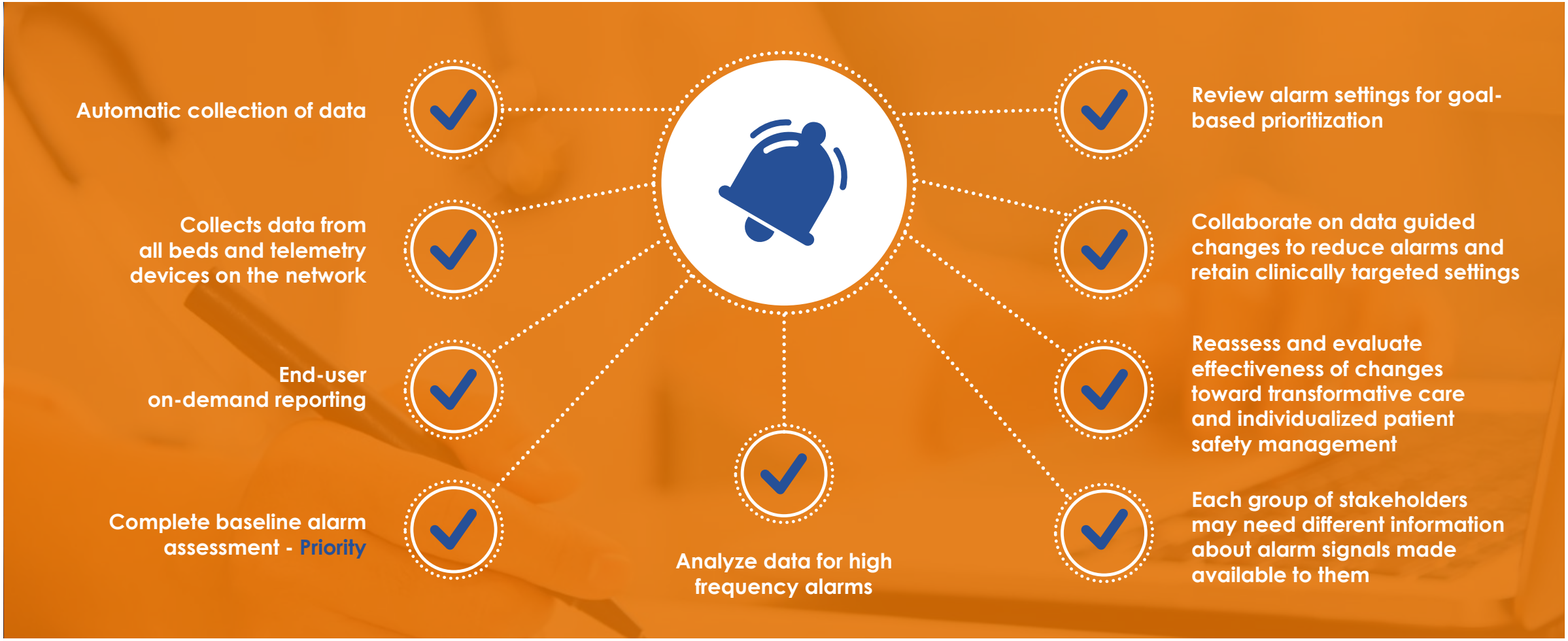
Assess Trends Proactively

Educate Patient

On need for continuous monitoring to increase patient understanding and nursing's commitment to patient safety

How Do I Measure My Changes?

Data – What to Look for in Alarm Reports



How Do I Measure My Changes?

Data – What to Look for in Alarm Reports

Real-time Data Or Metrics For Dashboard Reporting

- Typically Most Useful to Point-of Care Nurses
- Shifts with Most Alarms
- Alarms by Nursing by Unit
- Time of Week for Most Alarms
- Alarms by Bed, Shift or Time of Day
- Type of Alarm Sounding Most Often

How Do I Measure My Changes?

How Does Committee Determine Actionable vs. Non Actionable Alarms?

Critical Factors

Include point of care professionals

Consider how information about alarms and types of alarms could affect work environments

Staffing	**Workflow Analysis**	**Alarms Settings and Management**
Immediate Impact of Alarm Flood (10 or more alarms in 10 minutes)	**Protocol Management and Review**	**Metric Comparison Against Peers**

Monitoring for Outcomes

Clinically Relevant Process to Ensure No Negative Outcomes

Monitor Noise Level in the Unit

Survey Patient Satisfaction

Evaluate Incident Reports

Determine if issues are a result of alarms management changes

Convene Regular Safety Huddle

Monitor for Any Increase

Increase in rapid response calls, codes, unplanned transfers to critical care

THANK YOU FOR YOUR TIME!

To download this presentation, visit **nkuniversity.org/resources**

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