Development of Clinical Alarm Policies and Procedures at an Acute Care Hospital to Comply with The Joint Commission's New National Patient Safety Goal

Nursing Administration Role Practicum
California University of Pennsylvania
Antonio Malito

Why Is It Necessary To Develop Clinical Alarm Policies?

- Patient safety is our number one goal as healthcare providers
  - FDA reported 566 patient deaths related to monitor alarms from 2005-2008
  - Emergency Care Research Institute (ECRI) has named alarm hazards as the number one technology hazards for 2012, 2013, and 2014
  - The Joint Commission has been focusing on alarm safety for over a decade
    - 2003-National Patient Safety Goal to improve clinical alarm effectiveness
    - July 2014 to January 1,2016- National Patient Safety Goal on alarm management

New Joint Commission National Patient Safety Goal

- July 1, 2014- Leaders establish alarm system safety as a priority
- During 2014 identify the most important alarm signals to manage
- As of January 1, 2016 establish policies and procedures for managing alarms
- As of January 1, 2016 educate staff and practitioners about purpose and operation of alarm systems for which they are responsible

Why Are Current Systems Ineffective?

- Clinical alarms have an extremely high “false alarm” rate
  - False alarms can be those which have no triggering event or have no clinical relevance
  - One study measured 2,176 audible alarms during 928 hours of patient care—94% of the alarms were false positives
  - Leads to nursing staff ignoring alarms or not acting in a timely manner; sometimes referred to as alarm fatigue
    - Study by Bitan (2004) found a probability that a nurse will respond to an alarm within 15 seconds to be 5.3%; 30 seconds 6.7%; and 60 seconds 9.8%

Theoretical Framework

- Florence Nightingale's Environmental Theory
  - Focuses on many environmental factors that are necessary to restore a patient's health including a quiet/noise-free environment
    - Nurse must modify environment to promote healing

Theoretical Framework cont.

- Democratic Leadership
  - Policy development will require collaboration from many sectors (nursing, physicians/providers, risk management, etc.)
  - All groups must be allowed input to ensure policies developed are effective and are able to be acted on

- Quality Assurance
  - Not a philosophical issue but a measurable meeting expectations and conforming to requirements
  - Major role of the nurse administrator

AHN Credo

- Credo
  - “Allegheny Health Network is a team of care givers committed to improving health and promoting wellness in our communities, one person at a time. We pledge to consistently deliver safe, compassionate quality healthcare by treating the whole person- body, mind, and spirit”

What Has Been Accomplished?

- Clinical Alarm Teams Developed
  - Clinical Alarm Lead-Barbara Arvanitopulos/Kathy Hayes Light
    - Med/Surg-Melanie Soety/Antonio Malito
    - ED/Critical Care-Jean Lindenberger/Susan Boesch
    - Surgery-Charmaine Rohan/Renee Adamowicz
    - MCH-Kim Amon/Mary Fran Palmatier
  - Physician Champion-Dr. Steven Levy
- Alarm Inventory (Work in progress)

Alarm Inventory

Clinical Equipment Alarms	Central Monitor Y or N	Priority A=Highest; could result in death if unattended B=High priority; may lead to unintended consequence if unattended C- Low priority; little risk if unattended	Risk: Level of Oversight needed A-High B-Moderate C-Low	Level of oversight typically available	ICU	CNICU	SDU	ED	3N	4NE	4NW	OR	CVOR	PACU	Surgery Center	ORDA	Urology	endoscopy	SVEC	SSU	9N	8N	Joint Center	Dialysis	4SE	2N	Rehab	3R / 3RW	L&D	NICU	5N	Peds	Nursery	Radiology / MRI	Physical Therapy	Hardner Building	Cath Labs	Pre-admission testing	Lab, Blood Bank
Ventilators, adult/peds	NO	A	A		x	x		x						x																x									
Ventilators, transport	NO	A	A																											x									
Bipaps	NO	B	B		x	x	x	x	x	x	x		x	x	x						x	x			x	x					x	x							
Pump; IV, PCA, syringe,or epidural	NO	A	B		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Compression pump, leg	NO	B	B		X	X	X		X	x	x	x	x	x	x	x					x	x			x	x		x			x	x							
Fetal Incubators		A	A																											x				x					
Anesthesia machines												x			x																				x					
Wound VACs	NO	B	C		x	x			x					x																									
Bedside Monitoring Systems																																							
Nihon Kohden	YES	A	A		x	x	x																																
Nihon Kohden, portable	NO	B	B											x		x																							
HP, Welch Allyn or Witt Biomedical	YES	A	A					x																						x						x		
HP or Welch Allyn portable	NO	B	B				x	x	x	x	x				x	x	x	x		x	x	x	x	x	x	x	x	x			x	x		x	x	x	x	x	
Nihon Kohden Telemetry	YES	A	A						x	x	x											x	x			x													
Fetal Monitors; HP bedside	YES	A	B																										x									
Non-Direct Patient Care Alarms																																							
Blood Bank Refridgerators/Freezers	NO	B	B																																				x
Medical Gas Alarms	YES	A	C		x	x	x	x																															

Data Collection

- Survey developed by Healthcare Technology Foundation
  - Focused on identifying perceptions of clinical alarm issues, event occurrence, improvement measures, and priority of actions
  - Distributed to 80 medical-surgical nurse; 39 completed surveys returned (49% completion rate)

- Data collection by junior volunteers
  - Sought out volunteers on medical-surgical nursing units to determine frequency of any type of alarm nursing staff must respond to

Survey Results

Question	Percentage
Alarm sounds and/or visual displays should differentiate the priority of alarm	
--Strongly Agree	51.3%
--Agree	38.5%
--Neutral	7.7%
--Disagree	2.6%
--Strongly Disagree	--
Alarm sounds and/or visual displays should be distinct based on the parameter (e.g. heart rate) or source (device type)	
--Strongly Agree	46.2%
--Agree	46.2%
--Neutral	7.7%
--Disagree	--
--Strongly Disagree	--
Nuisance alarms occur frequently	
--Strongly Agree	25.6%
--Agree	46.2%
--Neutral	10.3%
--Disagree	12.8%
--Strongly Disagree	5.1%
Nuisance alarms disrupt patient care	35.9%
--Strongly Agree	46.2%
--Agree	7.7%
--Neutral	7.7%
--Disagree	2.6%
--Strongly Disagree	--

Question	Percentage
Nuisance alarms reduce trust in alarms and cause caregivers to inappropriately turn alarms off at times other than setup or procedural events	
--Strongly Agree	30.8%
--Agree	51.3%
--Neutral	5.1%
--Disagree	7.7%
--Strongly Disagree	5.1%
Properly setting alarm parameters and alerts is overly complex in existing devices	
--Strongly Agree	7.7%
--Agree	33.3%
--Neutral	30.8%
--Disagree	25.6%
--Strongly Disagree	2.6%
Newer monitoring systems (e.g., less than three years old) have solved most of the previous problems we experienced with clinical alarms	
--Strongly Agree	2.6%
--Agree	7.7%
--Neutral	53.8%
--Disagree	33.3%
--Strongly Disagree	2.6%

Survey Results cont.

Question	Percentage
The integration of clinical alarms into The Joint Commission patient safety measures have reduced patient adverse events	
--Strongly Agree	--
--Agree	28.2%
--Neutral	48.7%
--Disagree	20.5%
--Strongly Disagree	2.6%
The alarms used on my floor/area of the hospital are adequate to alert staff of potential or actual changes in a patient condition	
--Strongly Agree	--
--Agree	69.2%
--Neutral	15.4%
--Disagree	12.8%
--Strongly Disagree	2.6%
There have been frequent instances where alarms could not be heard and were missed	
--Strongly Agree	7.7%
--Agree	25.6%
--Neutral	15.4%
--Disagree	51.3%
--Strongly Disagree	--

Question	Percentage
Clinical staff is sensitive to alarms and responds quickly	
--Strongly Agree	7.7%
--Agree	59.0%
--Neutral	7.7%
--Disagree	20.5%
--Strongly Disagree	5.1%
The medical devices used on my unit/floor all have distinct outputs (i.e., sounds, repetition rates, visual displays, etc.) that allow users to identify the source of the alarm	
--Strongly Agree	5.1%
--Agree	71.8%
--Neutral	7.7%
--Disagree	12.8%
--Strongly Disagree	2.6%
When a number of devices are used with a patient, it can be confusing to determine which device is in an alarm condition	
--Strongly Agree	5.1%
--Agree	35.9%
--Neutral	23.1%
--Disagree	35.9%
--Strongly Disagree	--

Survey Results cont.

Question	Percentage
Environmental background noise has interfered with alarm recognition	
--Strongly Agree	5.1%
--Agree	43.6%
--Neutral	10.3%
--Disagree	41.0%
--Strongly Disagree	--
Central alarm management staff responsible for receiving alarm messages and alerting appropriate staff is helpful	
--Strongly Agree	10.3%
--Agree	51.3%
--Neutral	33.3%
--Disagree	5.1%
--Strongly Disagree	--
Alarm integration and communication systems via pagers, cell phones, and other wireless devices are useful for improving alarms management and response	
--Strongly Agree	2.6%
--Agree	38.5%
--Neutral	48.7%
--Disagree	7.7%
--Strongly Disagree	2.6%

Question	Percentage
Smart alarms (e.g., where multiple parameters, rate of change of parameters, and signal quality, are automatically assessed in their entirety) would be effective to use for reducing false alarms	
--Strongly Agree	7.7%
--Agree	61.5%
--Neutral	28.2%
--Disagree	2.6%
--Strongly Disagree	--
Smart alarms (e.g., where multiple parameters, rate of change of parameters, and signal quality, are automatically assessed in their entirety) would be effective to use for improving clinical response to important patient alarms	
--Strongly Agree	10.3%
--Agree	56.4%
--Neutral	28.2%
--Disagree	5.1%
--Strongly Disagree	--
Clinical policies and procedures regarding alarm management are effectively used in my facility	
--Strongly Agree	--
--Agree	48.7%
--Neutral	38.5%
--Disagree	5.1%
--Strongly Disagree	7.7%

Survey Results cont.

Question	Percentage
There is a requirement in your institution to document that the alarms are set and are appropriate for each patient	
--Strongly Agree	5.1%
--Agree	33.3%
--Neutral	43.6%
--Disagree	17.9%
--Strongly Disagree	--
Has your institution experienced adverse patient events in the last two years related to clinical alarm problems?	
--Yes	15.4%
--No	17.9%
--Not Sure	66.7%
Does your institution utilize "monitor watchers" in a central viewing area to observe and communicate alarm conditions to caregivers?	
--Yes	76.9%
--No	20.5%
--Not Sure	2.6%
Has your institution developed clinical alarm improvement initiatives over the past two years?	
--Yes	12.8%
--No	23.1%
--Not Sure	64.1%
Has your healthcare institution instituted new technological solutions to improve clinical alarm safety?	
--Yes	7.7%
--No	25.6%
--Not Sure	66.7%

Survey Results cont.

Importance of alarm issues

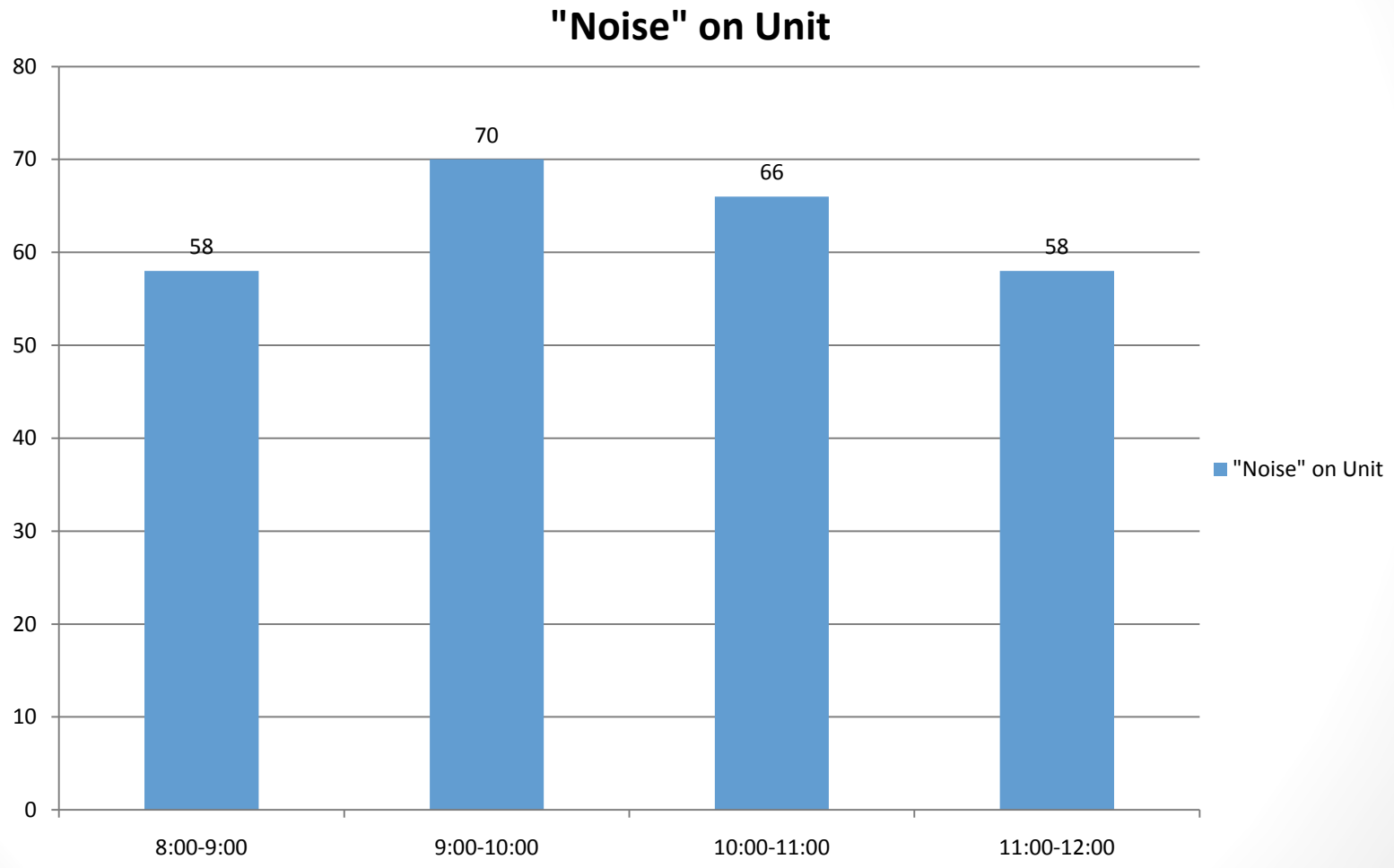
Question	Mean	Ranking
Difficulty in setting alarms properly	4.67	6
Difficulty in hearing alarms when they occur	4.00	3
Difficulty in identifying the source of an alarm	4.79	7
Difficulty in understanding the priority of an alarm	4.64	5
Frequent false alarms, which when they occur lead to reduced attention or response to alarms when they occur	3.95	2
Inadequate staff to respond to alarms as they occur	2.20	1
Over reliance on alarms to call attention to patient problems	4.44	4
Noise competition from non clinical alarms and pages	5.49	9
Lack of training on alarm systems	5.41	8

UNIT: TIME IN:

Volunteer Data Collection

DATE:	TIME	8:00 AM	8:05 AM	8:10 AM	8:15 AM	8:20 AM	8:25 AM	8:30 AM	8:35 AM	8:40 AM	8:45 AM	8:50 AM	8:55 AM	9:00 AM
ALARM TYPE	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
CALL BELL	xxxx													
EMERGENCY BELL	xxxx													
IV PUMP	xxxx													
PCA/EPIDURAL PUMP	xxxx xxxx													
LEG COMPRESSION PUMP (SCD)	xxxx xxxx													
BIPAP	xxxx													
AUTOMATED VITAL SIGNS(DYNAMAP)	xxxx xxxx													
PULSE OXIMETER	xxxx													
NIHON KOHDEN TELEMETRY	xxxx xxxx													
OTHER	Xxxx Xxxxx													

Volunteer Results



What Can We Learn From Others?

- Boston Medical Center
  - Conducted a six-week pilot on a cardiology unit focusing on reduction of telemetry alarms
  - Reset parameters to “crisis level” including heart rate below 45 (previously 50) or above 130 (previously 120)
  - Electronic order sets were made available for providers to set parameters for common arrhythmias
  - Any crisis alarm required the alarm to be immediately viewed by nursing where they must either respond to the patient for a clinically significant alarm or adjust the alarm settings to reflect the patient baseline
  - Changes to parameters for bradycardia, tachycardia, and HR limit settings could be made with two RN’s endorsing it and a physician order later obtained

Boston Medical Center

- Results from the pilot study
  - 89% reduction in average number of daily alarms (mostly from bradycardia and tachycardia alarms)
  - No adverse cardiac events related to missed alarms; code blue events decreased by half
  - Increased staff satisfaction
  - Increased patient satisfaction

- ALL OF THIS WAS ACCOMPLISHED WITHOUT ADDITIONAL TECHNOLOGY OR FINANCIAL RESOURCES

The Joint Commission Worksheet Examined

A	Name of equipment with alarm:			Comments	
1	Is there a risk to patients if the alarm signal is not attended to or if it malfunctions?	Yes	No		
2	Is the alarm needed?	Yes	No		
3	Does the alarm unnecessarily contribute to alarm noise or alarm fatigue?	Yes	No		
4	Is there a potential for patient harm based on internal incident history?	Yes	No		
5	Are there best practices and/or guidelines available for review?	Yes	No		
6	Based on 1-5 above is this an important alarm signal to manage?	Yes	No		
B	**If YES to A6, establish policies and procedures related to the following:**				
		Reference policy(s) and best practice/guidelines			
1	Clinically appropriate settings for alarm signals				
2	When alarm signals can be disabled				
3	When alarm parameters can be changed				
4	Who in the organization has the authority to change alarm parameters				
5	Who in the organization has the authority to set alarm parameters to “off”				
6	Process for monitoring alarm signals				
7	Process for responding to alarm signals				
8	Checking individual alarm signals for accurate settings				
9	Checking individual alarm signals for proper operation				
10	Checking individual alarm signals for detectability				

The Joint Commission Worksheet cont.

C	Developing Policies and Procedures & Education	Who		Date	
1	Responsible person/committee assigned to the development of policies and procedures & date for completion				
2	Responsible person/committee assigned to educate staff and licensed independent practitioners about the purpose and proper operation of alarm systems for which they are responsible and date for completion				
D	**Related to B 1-10, ensure that the education, training and competence have been demonstrated during orientation and periodically.**	**Who**		**Date**	
1	Responsible person/committee assigned to review process and sample files/records for documents & date for completion.				
	Notes of discussion by and person/committee assigned for any follow up.				
E	**Once follow-up has been completed and based on update, review the criteria, again respond to the questions:**				
1	Is there a risk to patients if the alarm signal is not attended to or if it malfunctions?	Yes	No		
2	Is the alarm needed?	Yes	No		
3	Does the alarm unnecessarily contribute to alarm noise or alarm fatigue?	Yes	No		
4	Is there a potential for patient harm based on internal incident history?	Yes	No		

The Joint Commission Worksheet cont.

Name of equipment with alarm:		Yes	No	N/A
Based on **SEA #50** have the following been established				
Actions Suggested by The Joint Commission **Recommendations and potential strategies for improvement** The first five correspond to recommendations made by both the Association for the Advancement of Medical Instrumentation (AAMI) and ECRI Institute. *Note: For details, see the AAMI and ECRI Institute websites.*				
1. Has Leadership ensured that there is a process in place for safe alarm management and response in high-risk areas (as identified by the organization)?				
2. Will this equipment be placed on the inventory of alarm-equipped medical devices used in high-risk areas and for high-risk clinical conditions?				
2A. If yes, have default alarm settings and the limits been established as appropriate for each care area?				
3. If identified as an alarm-equipped medical device used in high-risk areas and for high-risk clinical conditions have alarm settings been identified, including identification of situations when alarm signals are not clinically necessary?				
4. If identified as an alarm-equipped medical device used in high-risk areas and for high-risk clinical conditions have guidelines been established for tailoring alarm settings and limits for individual patients? The guidelines should address situations when can be limits modified to minimize alarm signals and the extent to which alarms can be modified to minimize alarm signals.				
5. Have processes been established to inspect, check, and maintain the alarm-equipped device to provide for accurate and appropriate alarm settings, proper operation, and detectability?				
5A. Has the frequency been based on criteria such as manufacturers' recommendations, risk levels, and current experience?				
Training and education				
6. Have all members of the clinical care team (as defined by the organization) been provided with training on the organization's process for safe alarm management and response in high-risk areas (as identified by the organization), and on the safe use of the alarmed medical devices on which they rely. (Also, are they provided with ongoing training on new alarmed medical devices and updates to alarmed medical devices, and ensure that new members of the clinical care team receive training on the alarmed medical devices on which they rely?)				
Equipment and physical environment				
7. Has a process been established to help reduce nuisance alarm signals such as to change single-use sensors (for example, ECG leads) according to manufacturer's recommendations, unless contraindicated?				
8. Has the area been assessed as to whether the acoustics in patient care areas allow critical alarm signals to be audible?				
Leadership and organizational planning				
9. Has the organization re-establish priorities for the adoption of alarm technology; the priority-setting process should drive technology adoption rather than allowing technology to drive the process?				
10. Has the organization established a cross-disciplinary team that includes representation from clinicians, clinical engineering, information technology, and risk management, to address alarm safety and the potential impact of alarm fatigue in all patient care areas? • Established a process for continual improvement and constant optimizing of alarm system policies and configurations? • Reviewed trends and patterns in alarm-related events to identify opportunities for improving alarm use? • Implemented an alarm system management policy, including the periodic review of alarm coverage processes and systems, and the development of realistic, implementable strategies to address vulnerabilities?				
11. Does the organization share information about alarm-related incidents, prevention strategies, and lessons learned with appropriate organizations, such as AAMI, ECRI Institute, the FDA, and The Joint Commission?				

A Look At Dynamapps

- A possible way to build the policy regarding dynamapps
  - Pre-set parameters
    - High heart rate-120
    - Low heart rate-50
    - SBP high-160
    - SBP low-80
    - DBP high-100
    - DBP low-50
    - SPO2 low-90
  - If a patient's baseline falls out of these parameters during continuous monitoring then the parameters need to be adjusted

Possible Policy for Adjusting Settings

- A possible solution to this problem could be
  - If a patient is outside parameters when discharged from PACU/procedural area adjust the settings as follows:
    - BP limits hypertensive patient: 15 mmhg over the patients SBP baseline or 10 mmhg over the DBP baseline
    - BP limits hypotensive patient: 10 mmhg under the SBP baseline or 5 mmhg under the DBP baseline
    - HR limits: If patient is tachycardic adjust limit 10 BPM over baseline, if bradycardic adjust 5 BPM under baseline
    - SPO2-Do not adjust
  - If the patient falls outside of the new parameters, notify the appropriate provider
  - Change settings back to pre-set parameters once the patient is done being monitored

Where To Go From Here?

- Establish who can set alarm parameters in each setting
  - Intensivist in critical care
  - Anesthesiologist in surgery/PACU
  - Provider ordering the equipment in other settings
- Make use of provider electronic order entry by asking for alarm parameters on any clinical alarm ordered
- REQUIRE parameters be set on all equipment and adjusted if nonactionable alarms occur frequently
- Educate hospital staff on any new policies, their role in following and enforcing these policies, and the expected results

Conclusion

- Alarm fatigue is a growing issue in the hospital setting that must be addressed
- Although the purpose of alarms is to alert staff to adverse conditions over 90% of all alarms are false
- To provide the safest care for our patients we must develop policies and procedures to improve the safety of our clinical alarm systems
- Once these policies are developed we hope to see a drastic decrease in the number of false alarms, increase in response time to alarms, and a decrease in adverse patient events

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