# Audible to Actionable:
## Alarm Management at Beth Israel Deaconess Medical Center

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# Call to Action: Sentinel Events

**Event 1: Desensitization to VT alarm**

- Delayed response to monitored patient with pulseless VT

**Event 2: Mistrust of telemetry signal**

- Delayed response to monitored patient with asystolic arrest

**Event 3: Apathy to leads off alarm**

- Delayed response to cardiac arrest in patient whose monitor leads had fallen off

**Event 4: Miscategorization of risk**

- Delayed response to cardiac arrest after monitoring suspended for off-floor procedure

# IN THE BEGINNING…

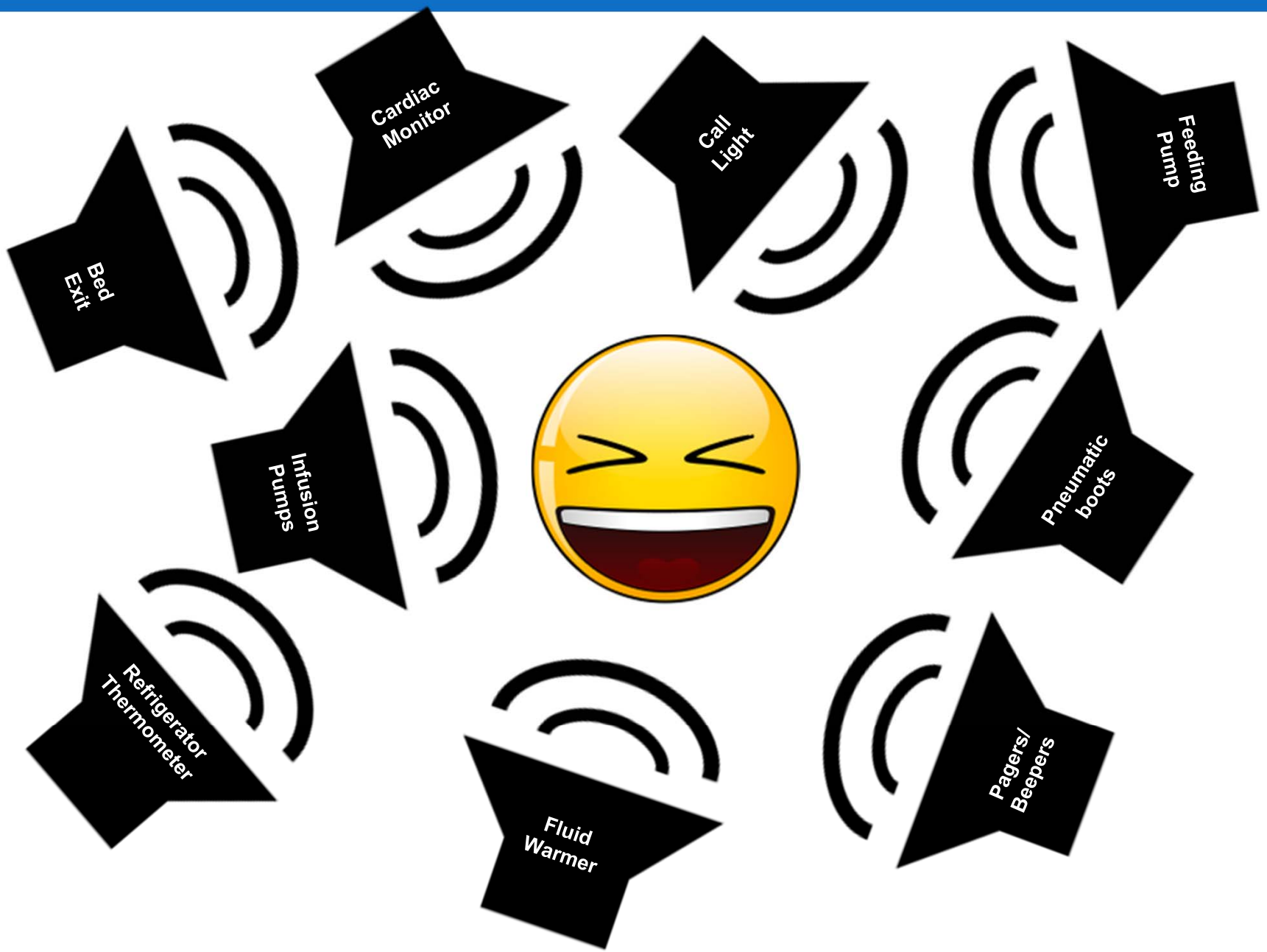
# There Was Audibility, Visibility…

- Audibility
  - Most hospitals focused on ensuring all alarms could be heard everywhere.
  - We set minimum volumes on central stations and other equipment
  - We added hallway speakers
- Visibility
  - We added marquees
  - We raised monitors so they could be seen

# And Accountability

- Who responds to alarms?
  - Alarms are everyone's responsibility
  - In reality…
- Added a role of "Alarm Responder"
- Telemetry Technicians
  - Set up training program
  - Cardiac units only – 32 beds/32 Telemetry units

# We Created Alarm Fatigue


Cardiac Monitor
Call Light
Feeding Pump
Bed Exit
Infusion Pumps
Pneumatic boots
Refrigerator Thermometer
Fluid Warmer
Pagers/ Beepers

# We Created Alarm Fatigue

- Increased the number of patients who could be monitored
- Added clinical equipment with alarms
  - Pumps, O2 Sat machines, bed exit alarms, call lights, vital sign machines
- Added other equipment with alarms
  - Pagers, door bells, refrigerator alarms

**In the name of patient safety**

# Quantifying the Problem

- Audits and Observations
  - 40-50% of Med/Surg patients on cardiac monitoring
  - 1200 cardiac monitor alarm signals in a 24 hour period
    - 32 Telemetry = 38 alarms per patient
    - One alarm every 1.2 minutes
  - One hour observation
    - Medical unit – alarm enunciating 100% of the time
    - Surgical unit – alarm enunciating 50% of the time
- Patient event reviews
- 2011 Alarm Summit

# TAKING ACTION

# Actions to Reduce Alarms

- Standardized equipment and configurations
- Structured orders for cardiac monitoring
- Reduce nuisance alarms
- Unit-based audits to track progress
- Upgrade monitoring system
- Education model for new clinical equipment
- Organizational involvement

# Orders for Cardiac Monitoring

- Auto-reminder for daily order
- Orders based on ACC and AHA guidelines for classification
  - Class 1 requires monitoring at all times
  - Class 2 requires an order to suspend monitoring during transport to tests and procedures
  - Class 3 (Neuro patients only – monitoring for Afib) includes order to allow transport without monitoring
- 80% of patients are Class 2 indication
- 90% of patients have monitoring renewed daily

# Telemetry Orders Daily Renewal Reminder

## Comparison of 2 analyses

| Category | April 2015 *n = 2029* | September 2015 *n = 1875* |
|---|---|---|
| Renewed | 90% | 90% |
| Discontinued | 10% | 10% |

# Telemetry Orders Indicated: by Class

## Comparison of 2 analyses

| Class | April 2015 *n = 1642* | September 2015 *n = 1477* |
|---|---|---|
| 1 | 15% | 13% |
| 2 | 77% | 82% |
| 3 | 8% | 4% |

*4/1/15 – 4/8/15 & 9/1/15 – 9/8/15*

Beth Israel Deaconess Medical Center

A teaching hospital of Harvard Medical School

The SILVERMAN INSTITUTE *For Heathcare Quality and Safety*

# Telemetry Orders by General Condition

## Comparison of 2 analyses

| Indication | April 2015<br>*n = 1642* | September 2015<br>*n = 1477* |
|---|---|---|
| Acute Coronary Syndrome (ACS)/Cardiac Ischemia | 11.3% | 10.4% |
| Acute Neurological Event | 10.4% | 6.4% |
| Arrhythmia | 10.0% | 10.2% |
| Clinical Trigger Activation | 2.5% | 2.3% |
| Continuous O2 Saturation Monitoring | 19.7% | 21.6% |
| Electrolyte Abnormality (Severe) | 2.4% | 2.7% |
| Heart Failure (Decompensated) | 13.2% | 12.5% |
| Medication Monitoring/Overdose | 0.9% | 1.8% |
| Myocarditis/Pericarditis | 0.2% | 1.2% |
| Other | 12.4% | 14.7% |
| Post-Cardiac Arrest | 0.1% | 0.4% |
| Post-Procedure/Cardiac Surgery | 11.0% | 10.2% |
| Step-down | 3.0% | 3.9% |
| Syncope | 2.7% | 1.8% |

*4/1/15 – 4/8/15 & 9/1/15 – 9/8/15*

# Decrease Nuisance Alarms

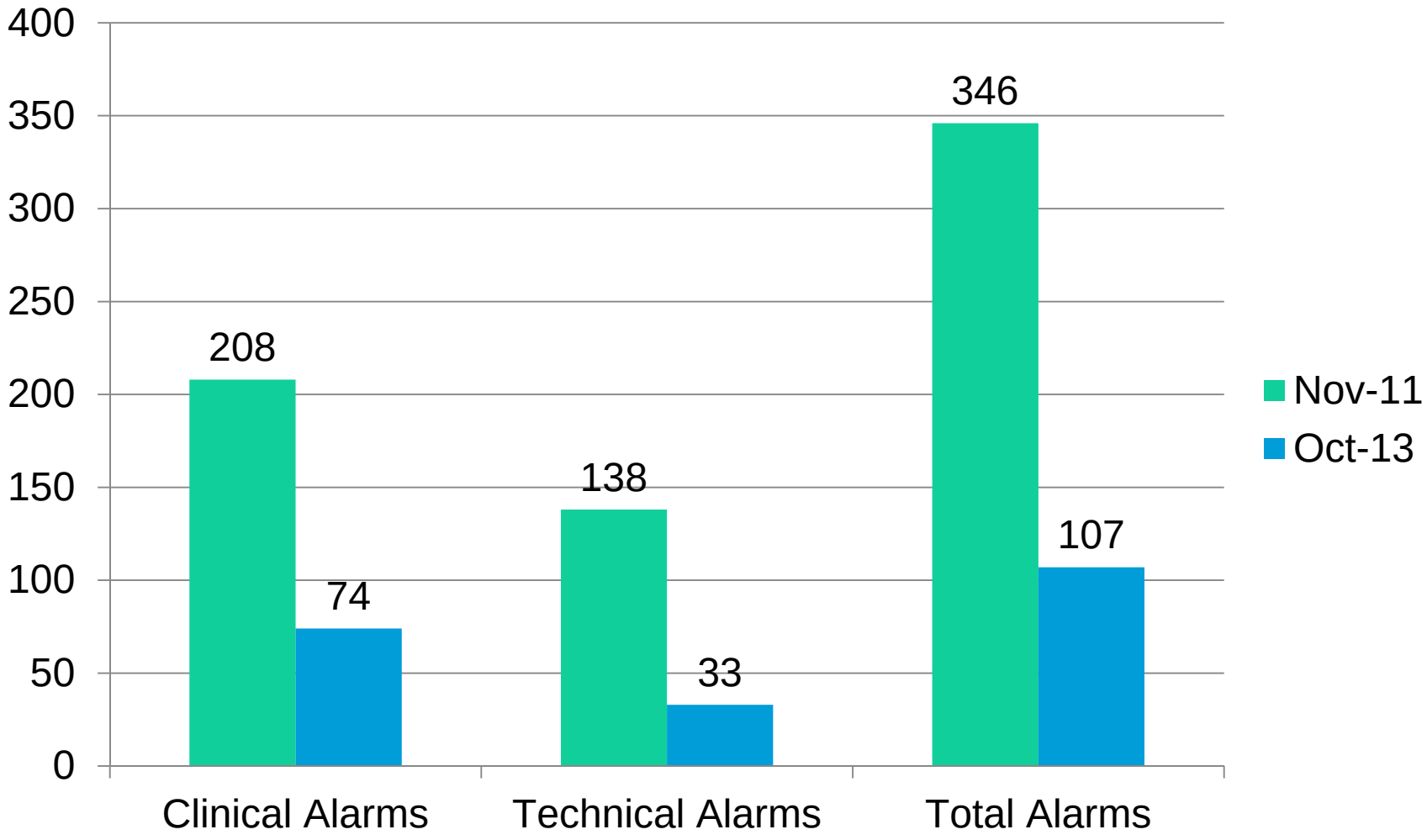
- Multidisciplinary Telemetry Task Force
  - Alarm audits from monitoring system
  - Reviewed all default settings
  - Collaborated with Electrophysiology MD expert
  - Made recommended changes to alarm settings
    - Expanded default settings
    - Turned off many medium priority alarms (yellow)
  - Instituted daily electrode change
  - Monitored for patient events

# Alarm Default Changes

| Alarm | Prior Setting | Current Setting |
|---|---|---|
| High Heart Rate | >120 | >130 |
| Non-sustained VT | On | Off |
| Run PVCs | >2 | Off |
| PVC Rate | >10 PVCs/min | >20 PVCs/min* |
| Pause | >2.0 sec | >2.5 sec |
| Vfib/Vtach | >100b/min | >120 b/min |
| Extreme Brady | <40 b/min | <35 b/min |
| Extreme Tachy | >140 b/min | >150 b/min |

*Setting changed in 2013 to >15 PVCs/min
Changed in 2014 to >18 PVCs/min
Changed in 2015 to >20 PVCs/min

# BIDMC Alarm Data – Pre and Post Interventions



# Results of Interventions

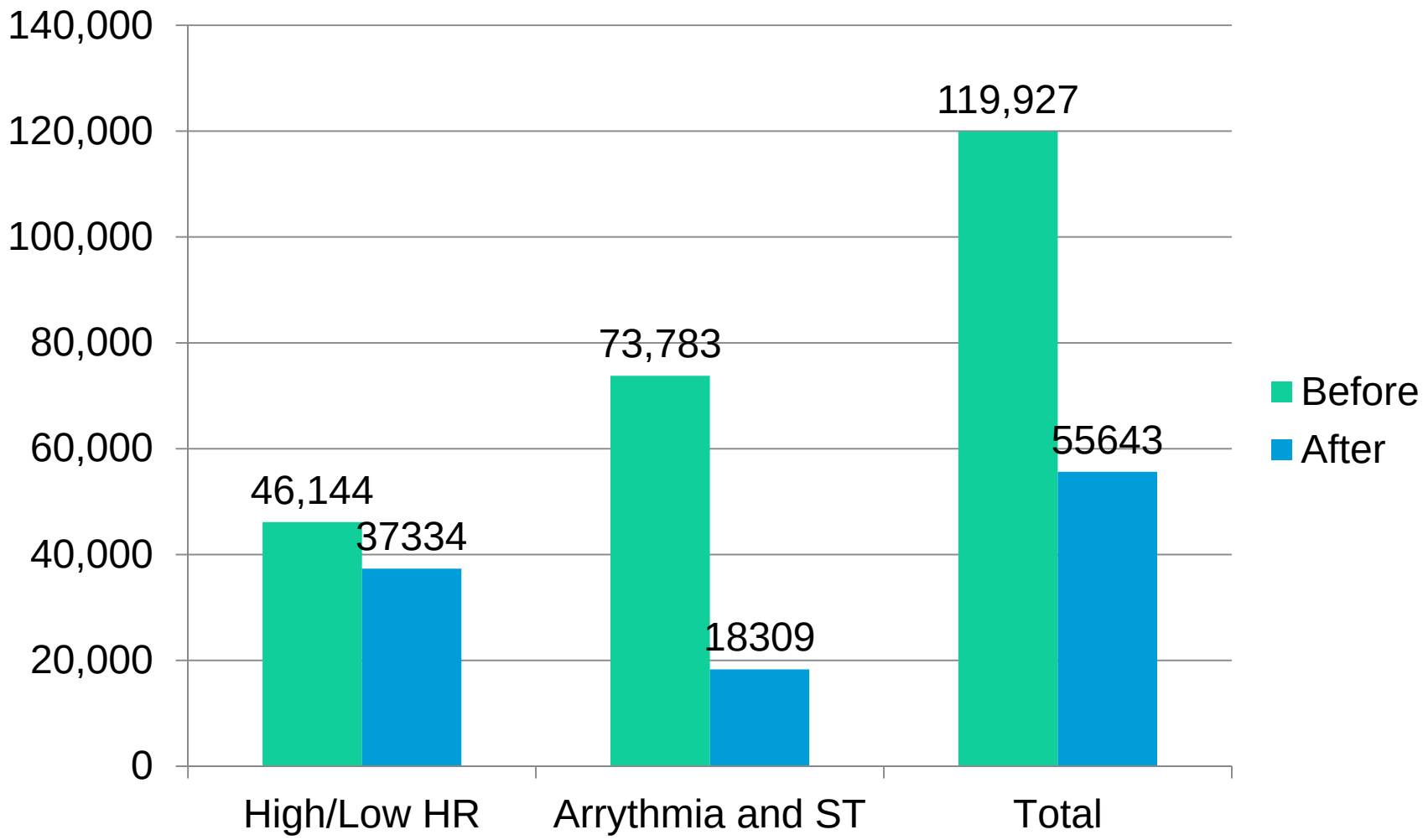
- 30% decrease in alarm signals
- Decrease in response time to critical alarms from 45 seconds to 10-15 seconds
- Decrease in response to “leads-off” from more than three minutes to less than two minutes

- Yearly nursing competency assessment
- Alarm parameters defined to meet “actionable” thresholds
- Defined goals and response protocols for alarm signals
- Established Telemetry Task Force
  - Multidisciplinary team
  - Physicians, nurses, clinical engineers, health care quality leads, telemetry technicians

# Critical Care Alarms

- Alarm fatigue staff survey
  - 84% believe alarm fatigue is a problem
- Alarm data for 3 months for 5 ICUs
  - 268,568 alarms
    - Medium priority alarms account for 28%
    - Heart rate alarms account for 18%
- Reset alarm settings
  - Many medium priority alarms turned off
  - Heart rate parameters changed

# ICU Alarm Change Results



# Monitoring Equipment Upgrade

- 2013 began replacing our Med/Surg cardiac monitoring equipment
  - Enhanced alarm management
    - Ability to set alarm priorities
    - Audit logs by unit
  - Remote displays
- Initial installation
  - Vendor model education and implementation
  - Opportunity for a “do over”


# Education Model Transformed

- Traditional model
  - Vendor educator trains super-users and staff
  - Super users train staff
  - Go-Live support by vendor

- New model – designed for integrating the system into workflow

I Telemetry

Continuous Cardiac Monitoring

*The beat goes on…*

# Education Plan

- Module 1: eLearning
  - Content from vendor imported into our eLearning system
  - 11 Independent on line interactive modules with post-test
- Module 2: Simulation
  - Competency based scenarios with unit educator
  - Content includes basic operations
    - Admit/Discharge
    - Standby
    - SPO2 monitoring
    - Alarm management, leads off, expected staff response

I Telemetry

Continuous Cardiac Monitoring

*The beat goes on…*

# Education Plan

- Module 3: Unit go-live
  - Three day-24 hour hands on support by vendor
  - Skills checklist
  - Telemetry team support
    - Daily huddles for 3 days
    - UBE/CNS coverage from prior units
  - Trifold Quick tips for users
  - Education binder with standards, competencies, and references

# TODAY

Ongoing efforts to manage alarms at BIDMC

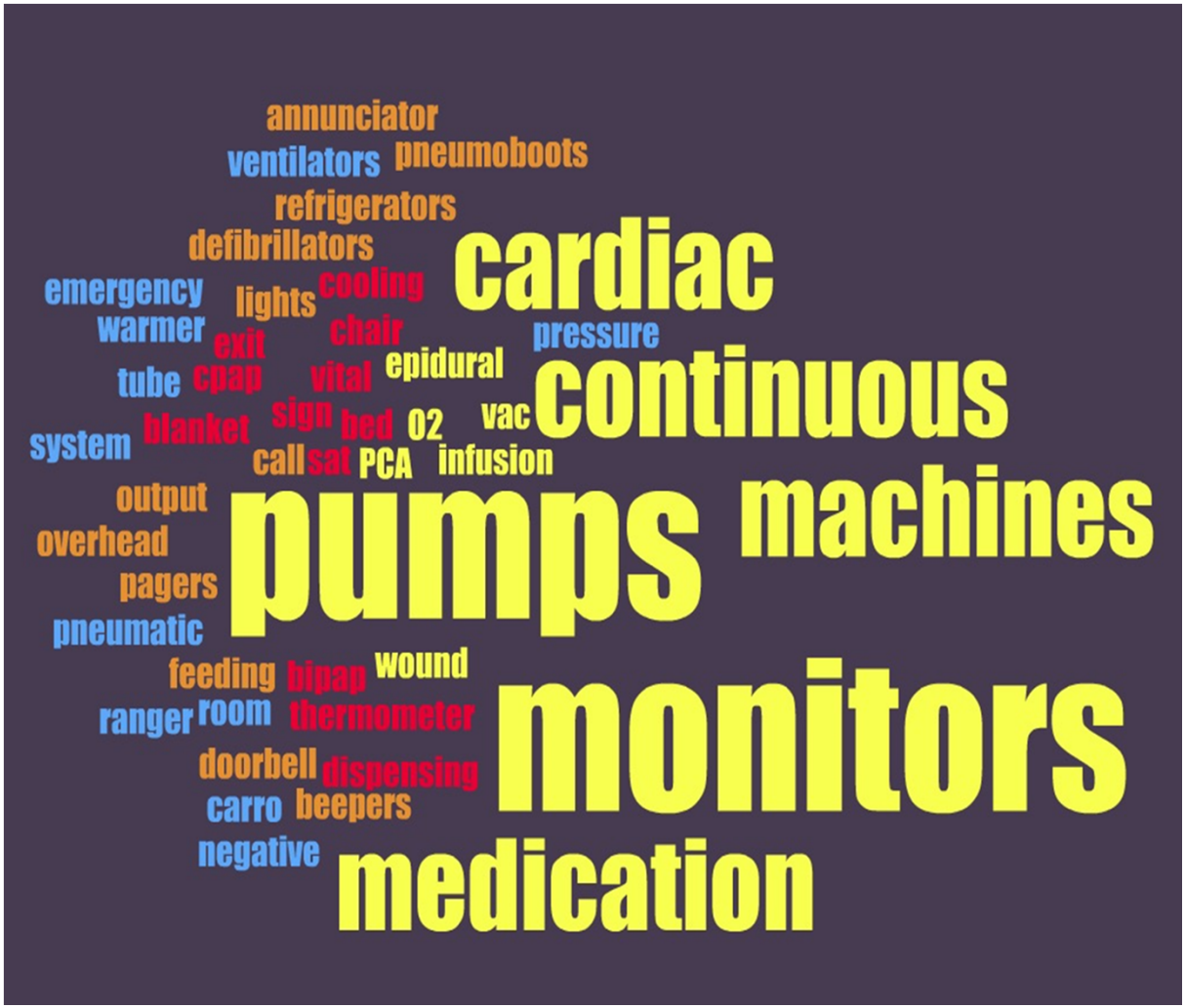
# Alarms Management Oversight Committee

- Monitoring and Alarm Practice - MedSurg
- ED Quality Committee Alarms Reduction Initiative
- ICU/SD Alarms Monitoring Work Group
- Peri-op Alarms Task Force
- Women's Health/ Neonatology Quality Committee

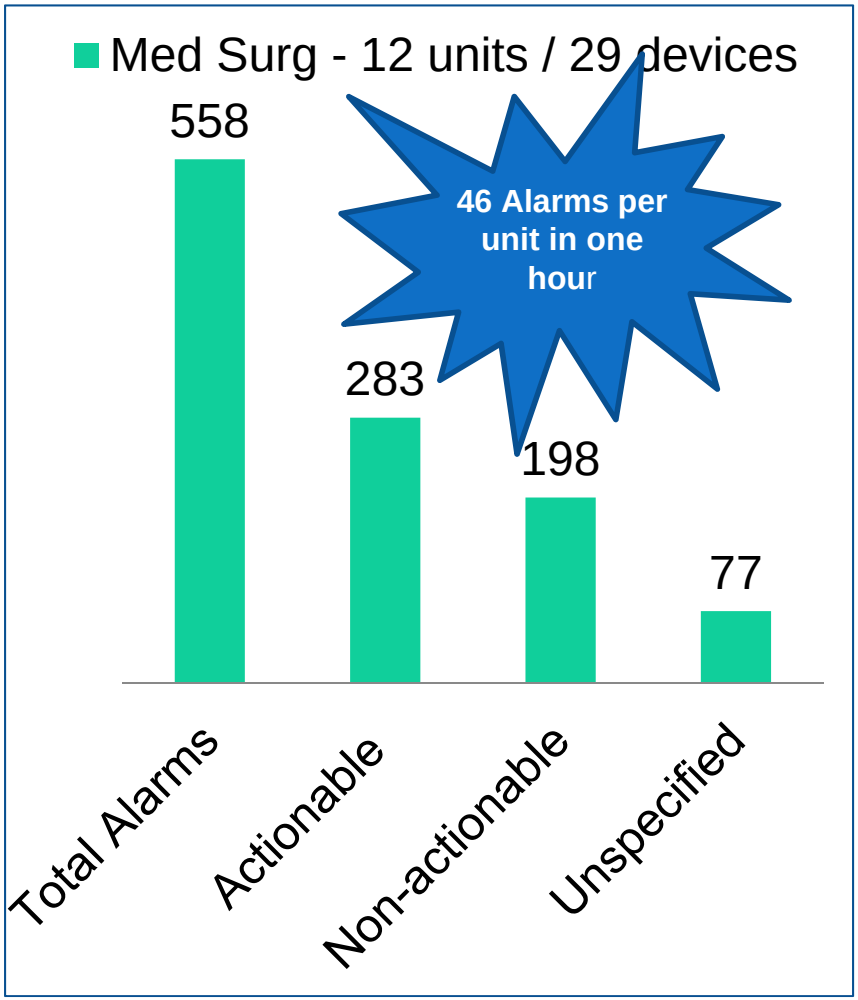
# Alarm Management Oversight Committee

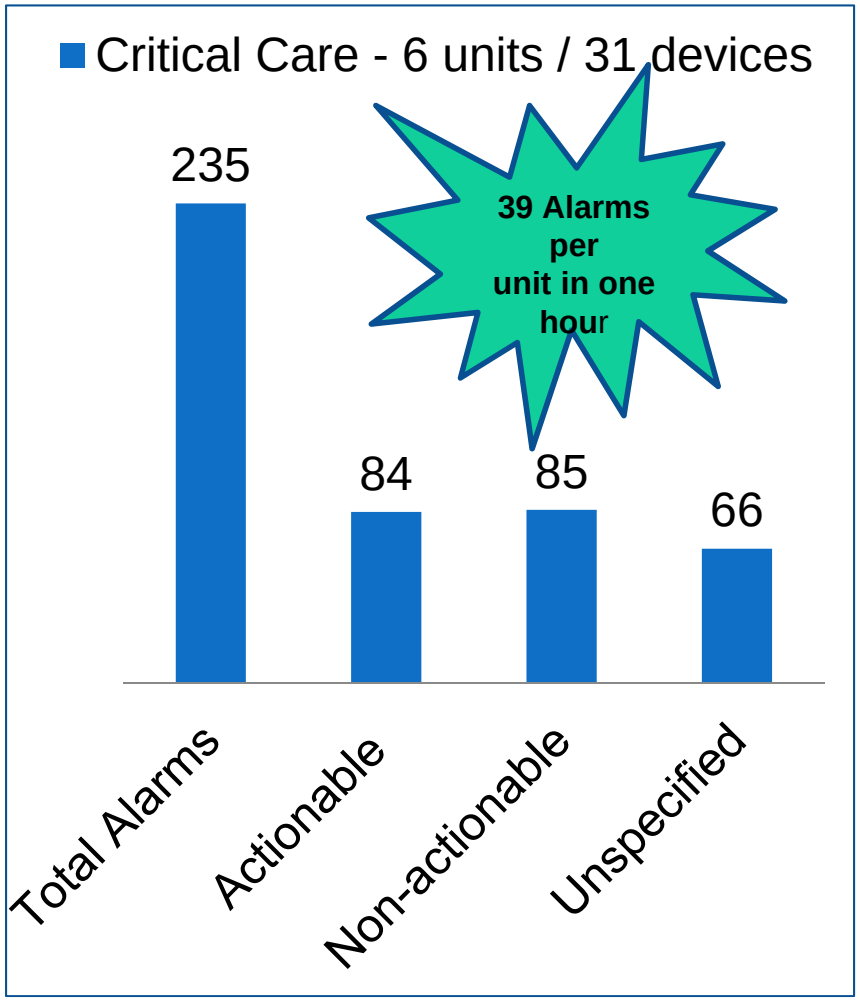
- Short term goals
  - Audit of equipment
  - Audit of observed alarms
  - Standardize alarm language
  - Alarm management policy
  - Alarm management education
- Long term goals
  - Advise service line committees
  - Report on initiatives to Environment of Care Committee
  - Joint Commission compliance

# Equipment & Alarm Audits



# One hour observation of alarms



# Alarm Management Policy

Title: Managing Clinical Alarms of Patient Care Devices

Purpose:

- To foster patient safety through effective management and operation of clinical alarm systems at BIDMC and reduce opportunity for alarm fatigue, a desensitization to alarm awareness due to frequent and constant occurrence.

- To provide systemic and coordinated guidance to the organization in effectively addressing Joint Commission's National Patient Safety Goal of Improving the Safety of Clinical Alarm Systems.

Education program in eLearning for clinical staff

# MANAGING CLINICAL ALARMS @ BIDMC

Fostering Patient Safety with Effective Management and Operation of Clinical Alarm Systems of Patient Care Devices

# TOMORROW

# Future of Alarm Management at BIDMC

- Evaluate all new processes and equipment which generate an alarm
  - Actionable vs Non-actionable
  - Impact on work environment
- Continue to expand alarm work to other high volume alarms
  - Nurse Call System
  - Infusion pumps
- **WOW** TJC with our alarm management efforts!

Thank you!

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