

# Reducing Non-Critical Telemetry Alarm Activations: A Continuous Quality Improvement Project

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## BACKGROUND

- Inpatient central monitoring units (CMU) are vital to the safety of hospitalized patients.
- Excessive telemetry activations are a source of fatigue, stress, and distraction to hospital staff.
- Adverse events have been reported in association with excessive alarms activations.
- We sought to decrease the number of total non-critical alarms in an effort to reduce distraction from more serious telemetry events.

### High Priority

- Asystole
- VF/VT
- Extreme Tachycardia
- Extreme Bradycardia

### Medium Priority

- Non-sustained VT
- Ventricular Rhythm
- Run of PVCs
- Pair of PVCs
- Trigeminy
- Bigeminy
- PVCs Per Minute
- Multiform PVCs
- Pauses
- Pacer not Capture
- Pacer not Pace
- Missed Beat
- SVT
- Heart Rate (HR) High/Low
- Atrial Fib Begin/End
- Irregular HR Begin/End

**Table 1:** All available alarm trigger event types for high and medium priority alarms.

### AIM:

- To reduce and maintain the number of total non-critical central telemetry alarms on our cardiology wards at a large tertiary referral center by 50% within a nine-month period.

## METHODS

Current settings for alarm activations compared to other academic medical centers in the region revealed the root cause of excessive alarm activation and fatigue is due to lenient alarm parameters.

### Stakeholders:

- Patients
- Nursing staff, managers, CMU technicians
- Physicians: cardiologists
- Philips USA™ engineers
- Risk managers

### Intervention:

- Team of clinicians, experts, and stakeholders were charged with task of addressing this issue.
- Current policies, settings, and parameters were reviewed in think-tank meetings, supervised by faculty cardiologists.
- Baseline and quarterly follow-up data were collected and analyzed.

### Setting Changes:

#### Modified Thresholds:

- Pause adjusted to 2.5 seconds
- PVC burden: 10 per 30 minutes
- HR Low 40 bpm, HR High 130 bpm
- Afib duration > 120 min
- VT lower rate limit 120 bpm for 10 complexes
- Oxygen saturation 80% or less for 10 seconds or greater

#### Disabled Alarms:

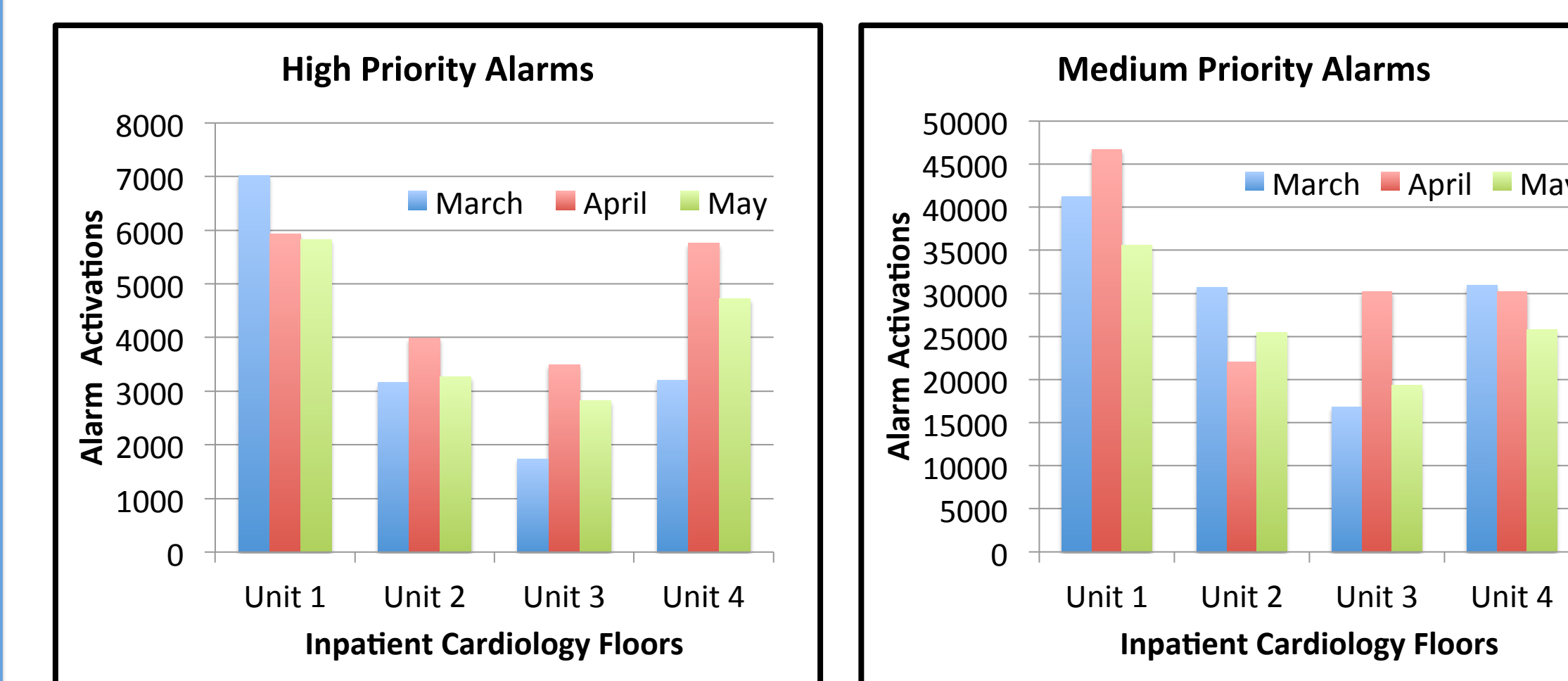
- Missed beats
- Non-sustained ventricular tachycardia
- Ventricular rhythm (consecutive beats <Run and <Rate of ventricular tachycardia)
- Run or pair of PVC, trigeminy, bigeminy
- Multiform PVCs
- R on T complex

## RESULTS

- Baseline data interval: 3/1/2019 – 5/31/2019
- Intervention date: June 2019
- Quarter 1 data interval: 7/1/2019 – 9/30/2019

### Baseline Data:

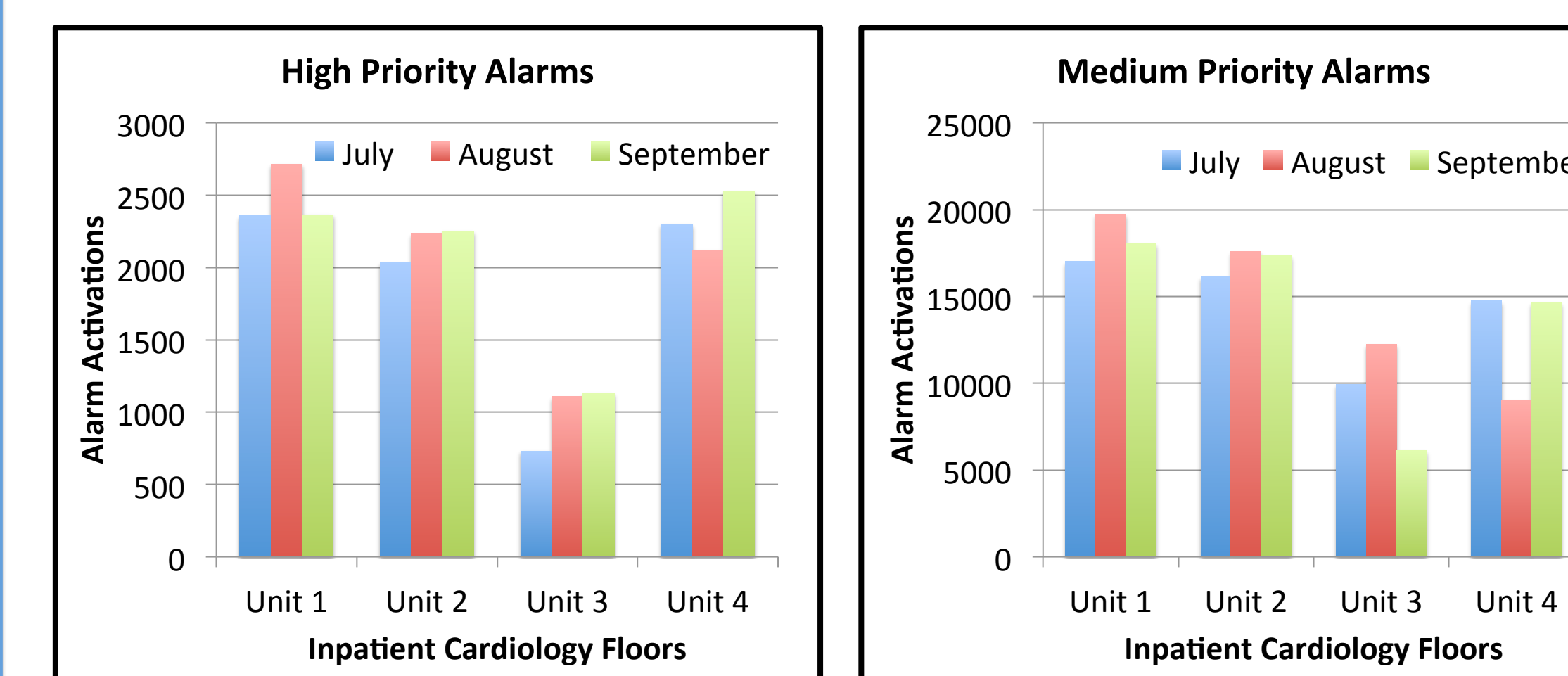
- Total alarms: 405,954



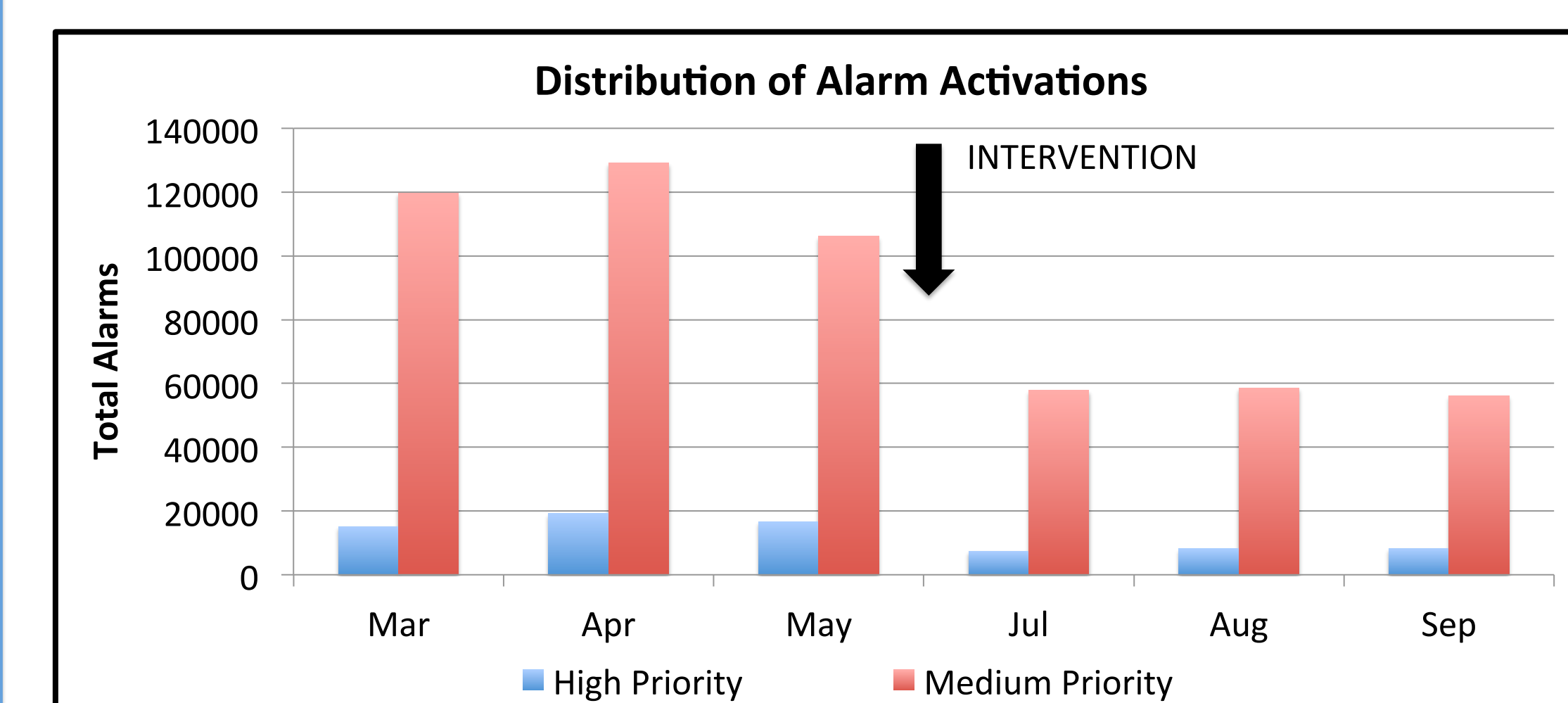
**Figure 1:** High and medium priority alarm activations for baseline months, March-May.

### First Quarter Data:

- Total alarms: 196,455



**Figure 2:** High and medium priority alarm activations for first quarter, July-September.



**Figure 3:** Trends in total alarm activations over baseline & first quarter with date of intervention.

## DISCUSSION

- Baseline data revealed a total of 405,954 alarm activations on four inpatient cardiology floors during a three-month period.
- Thresholds for pauses, premature beats, pulse ranges, brief non-sustained arrhythmias, and atrial fibrillation were modified, as shown in methods.
- Post intervention data in the first quarter revealed a total of 196,455 alarm activations.
- This is a 51% reduction in non-critical alarm activations.
- All deaths and adverse events during these periods were reviewed by one of the co-authors (EP) and none were attributable to changes in alarm settings.

### Conclusion:

- Careful modification of telemetry alarm settings results in a significant reduction in total alarms and percentage of non-critical alarms.
- Reduction of staff distraction due to excessive alarm activations may result in less near-miss and adverse events in patient care.

### Continuous Quality Improvement:

- Further data retrieval and analysis is required to assess sustainability of setting changes.
- Long term clinical outcomes such as mortality and morbidity are required.
- External validation via staff member surveys on alarm fatigue reduction is necessary.

Conflict of Interest: None  
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