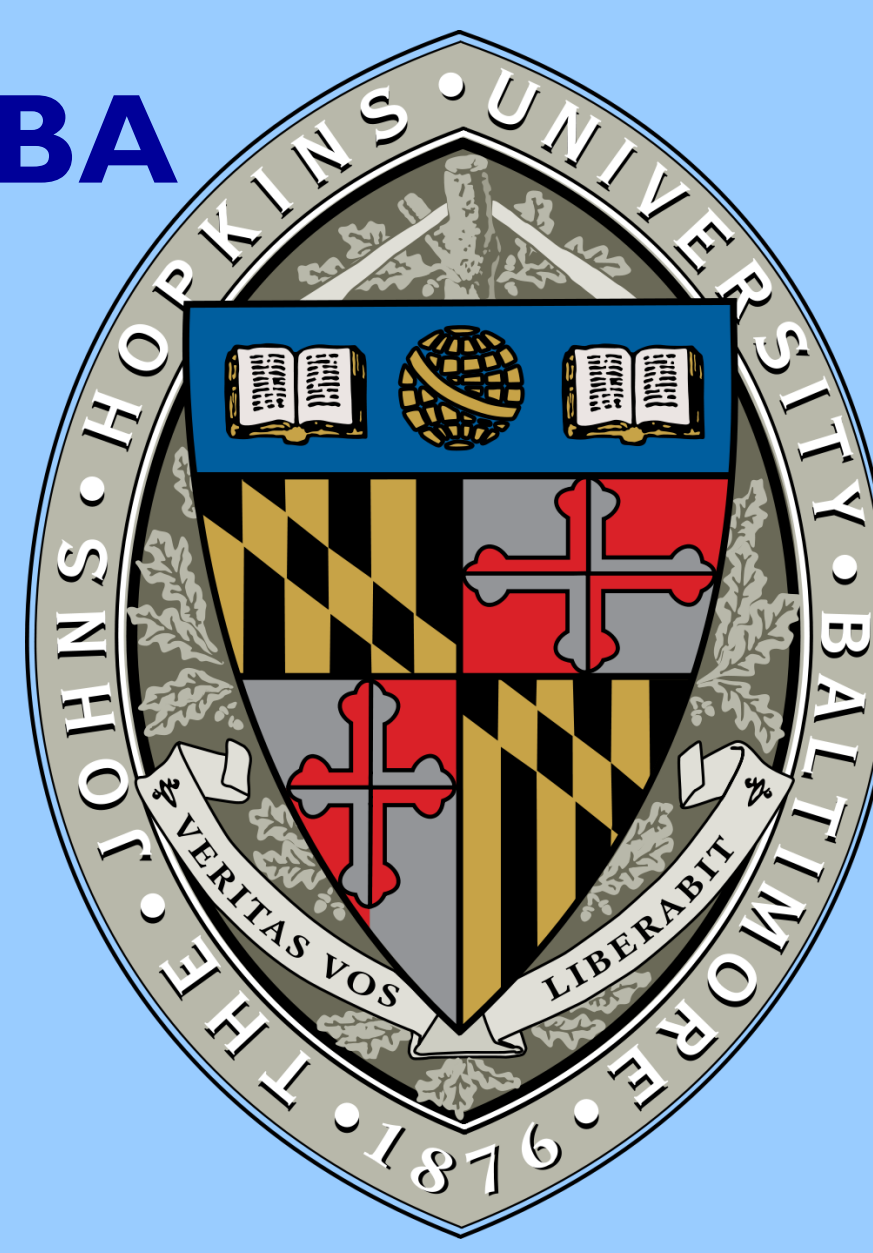


# Pediatric Emergency Dept. Alarm Fatigue

Mary Vess, BS; Laura Winner, RN, BSN, MBA  
Gail Schoolden, DNP, APRN-CNS, CPEN



Johns Hopkins University  
School of Nursing  
Johns Hopkins Hospital, Baltimore, MD

## 1 Background

Nuisance alarms interfere with the work of nurses in the JHH Pediatric ED and contribute to alarm fatigue, which creates the potential for adverse events.<sup>1</sup> Additionally, they have led to nurse dissatisfaction on the unit.

Our objectives were to reduce the total number of targeted physiologic alarms (high heart rate, SpO<sub>2</sub> low, and SpO<sub>2</sub> probe off) per week in the Pediatric ED by half by Dec. 31, 2016 (Fig. 1) and to reduce the average duration for warning and advisory alarms in the Pediatric ED by half by Dec. 31, 2016 (Tables 1 & 2).

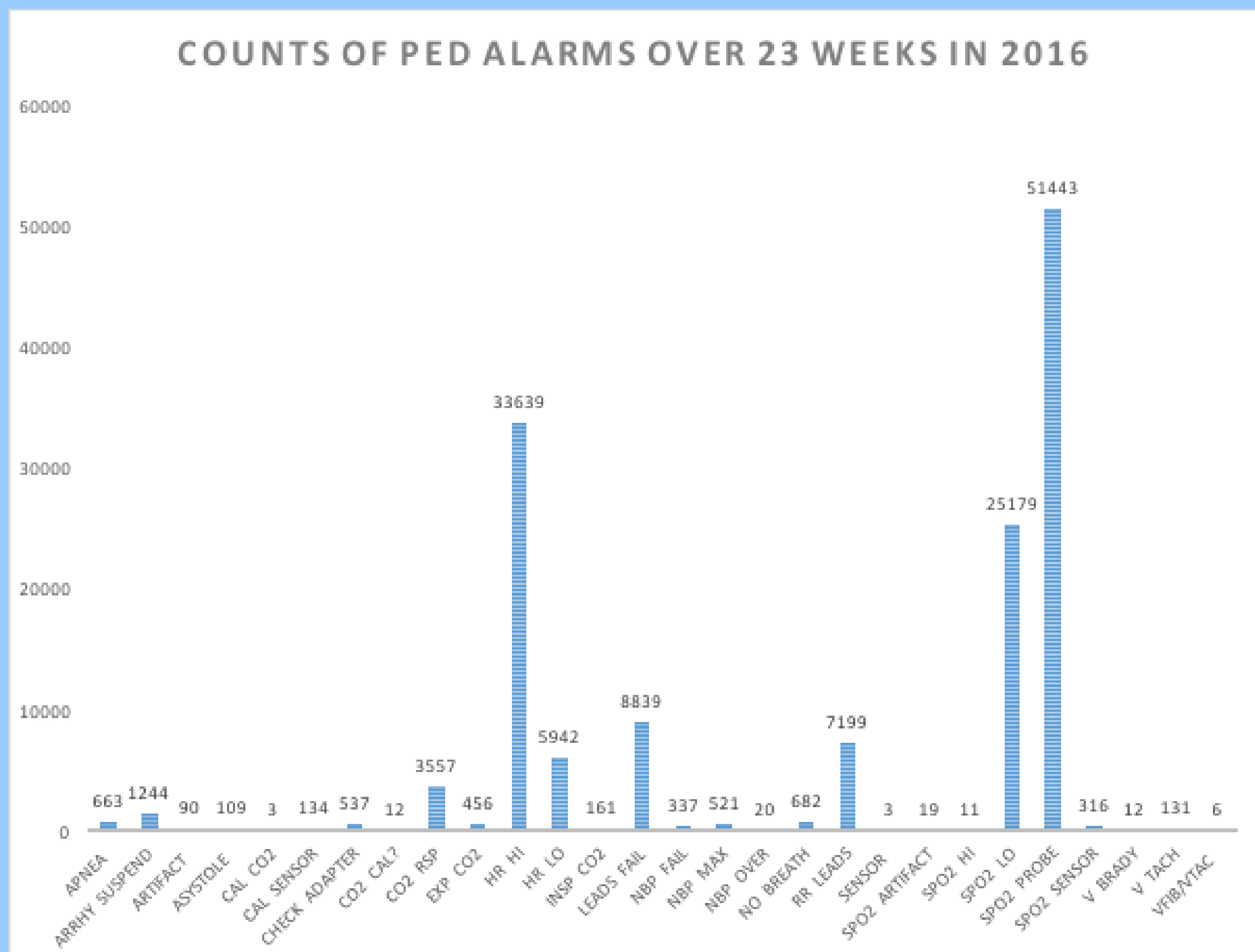


Figure 1: The decision to focus on the SpO<sub>2</sub> Low, High Heart Rate, and SpO<sub>2</sub> probe off was based on data gathered.

AVE CRI DURATION (SECONDS)	AVE WAR DURATION (SECONDS)	AVE ADV DURATION (SECONDS)	AVE SYS DURATION (SECONDS)	QUANTITY OF WAR ALARMS > 60 SEC	QUANTITY OF SYS ALARMS > 60 SEC
77	40	30	67	4	231

Table 1: Average of 23 weeks during 2016

Priority Level	Alarm Sound	Example
A - Requires immediate attention	<b>Crisis:</b> 3 audible beeps continuously	Asystole, VFib, VTach
B - Requires attention as soon as possible	<b>Warning:</b> 2 audible beeps continuously <b>System Warning:</b> Continuous foghorn sound	CO <sub>2</sub> No Breath, Resp Apnea
C - Timely response required	<b>Advisory:</b> 1 audible beep continuously <b>System Advisory:</b> Single foghorn sound	SPO <sub>2</sub> low

Table 2: Alarm priority, sound, and type information.

## 2 Methods

- Quality Improvement Methodology used was Define, Measure, Analyze, Improve, Control (DMAIC)
- We gathered and analyzed data with the help of clinical engineering from the physiological alarm monitoring machines (see Figs. 2 and 3).
- Other methods included literature review and observation.

## 4 Conclusions

- Number of alarms sounding can safely be decreased by widening the parameters for certain age groups and certain types of alarms and by eliminating the SpO<sub>2</sub> probe off alarm. PED nursing staff do not consistently set alarm parameters correctly or use functions such as pause appropriately.

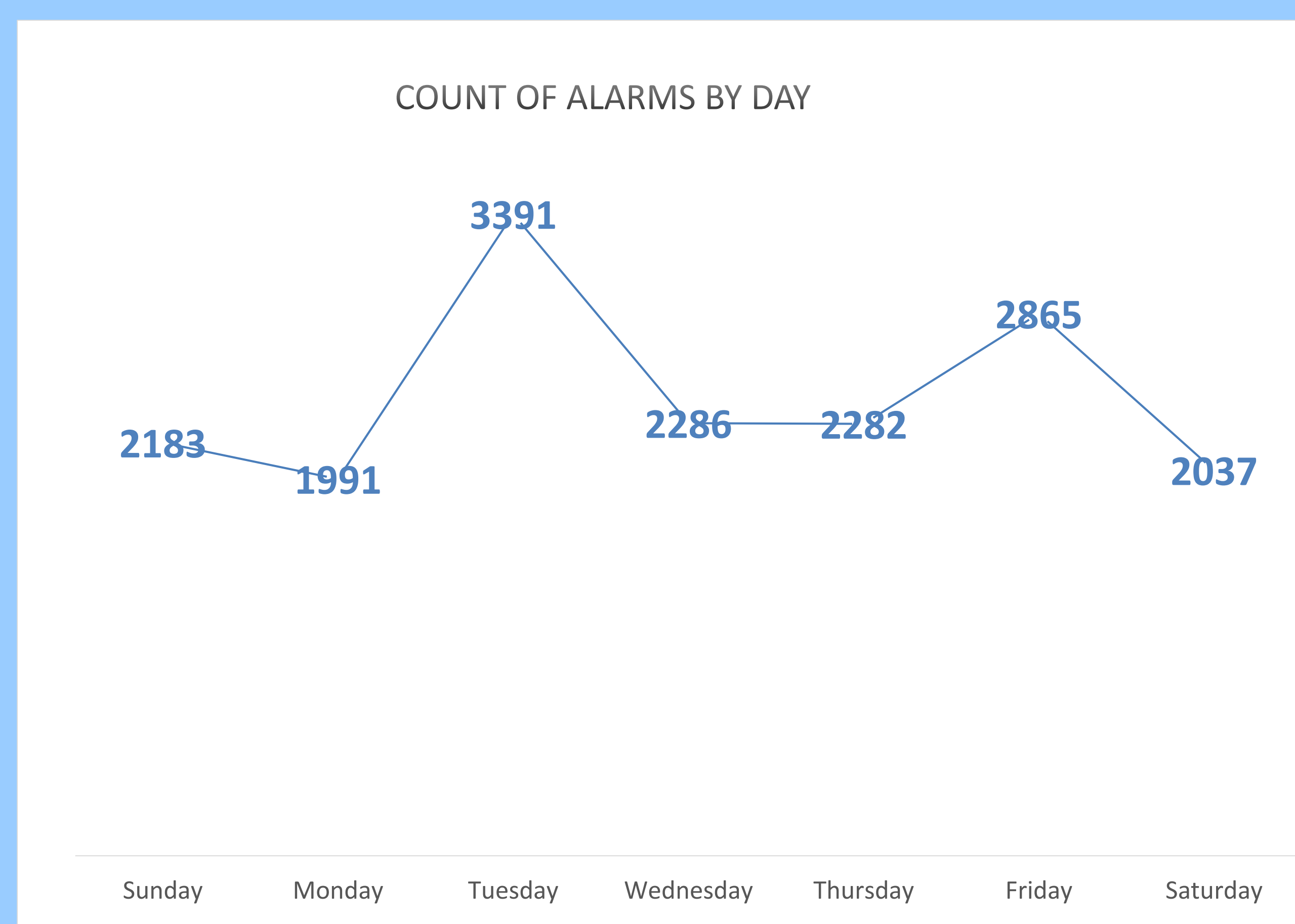


Figure 2: Count of Alarms by day of the week for 4 weeks.

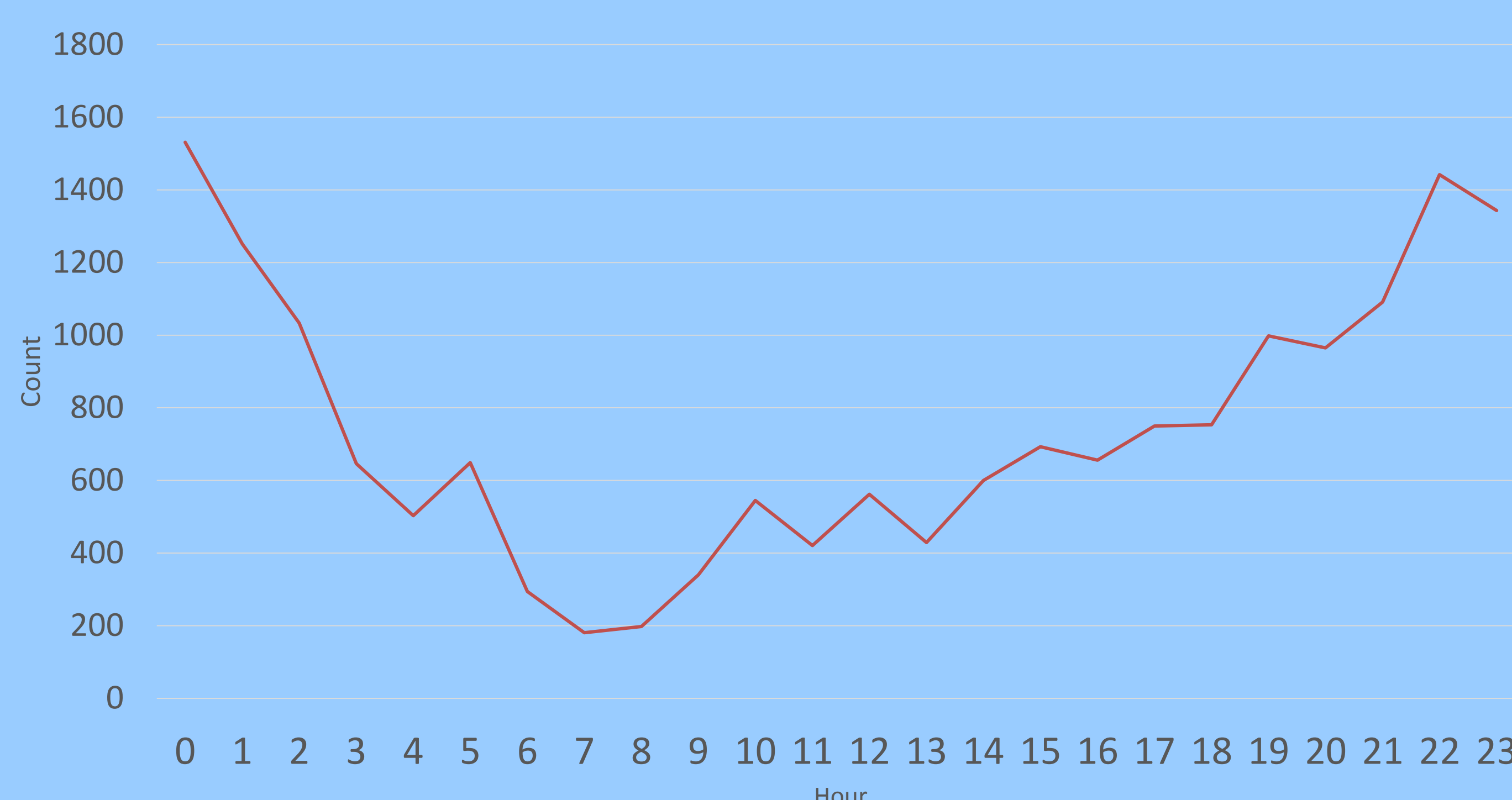


Figure 3: Count of Alarms by hour of the day, consistent with patient census.

## 5 Future Directions

Continue to monitor alarm counts and durations as system changes and education initiatives are implemented. Target additional education efforts or staffing policy changes based on new findings.

## 6 References

1. Cvach, M. (2012). Monitor alarm fatigue: An integrative review. *Biomedical Instrumentation & Technology*, 46(4), 268. doi:10.2345/0899-8205-46.4.268

## 3 Results

- Changes in the PED:
- Modify Alarm Limits, Timing, Phone Escalation Pathway
  - Staff Education and addition of alarm management skills competencies.

### Funding Source:

The Helene Fuld Leadership Program for the Advancement of Patient Care Quality and Safety