Obtaining Baseline Alarm Data and Reducing Non-Actionable Alarms

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Objectives

- Review benchmarks and recommendations for alarm safety surveillance program
- Describe methods of obtaining baseline alarm data in absence of middleware technology
- Discuss elements of alarm safety surveillance
- Describe Staff education: utilizing EBP to reduce excessive alarms
- Discuss evaluation of alarm safety project

Literature Review

- Exposing clinicians to an excessive alarms desensitizes them to the alarms and can cause them to miss alarms. (Sendelbach, 2013)
- Current evidence supports specific nursing practices to improve alarm safety and reduce alarm burden. (AACN, practice alert 2013)
- Alarm safety experts report that daily lead changes reduce alarm burden in ICUs by 46%. (Cvach, 2012)
- Alarm reports and staff education are fundamental to quality improvement related to alarm safety. (Cosper, 2017)

Chicago, Illinois

Environmental survey

- Rush University Medical Center
- Stakeholders
- Pilot project area
- Strengths
- Weaknesses
- Interdisciplinary committee
- Competing projects

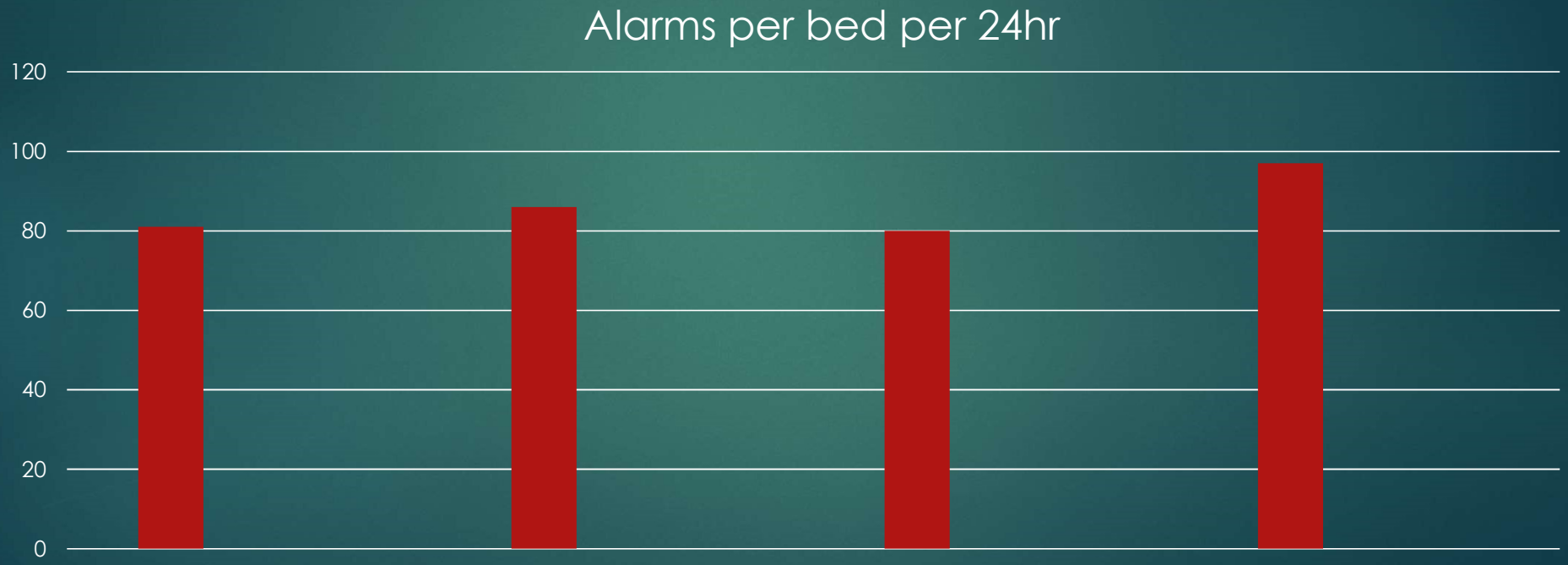
Stakeholders in alarm safety

- Patients
- Nursing leadership
- Clinicians
- Clinical Engineering
- Information Services/Technology
- Risk Management
- Technology representatives/Equipment vendors

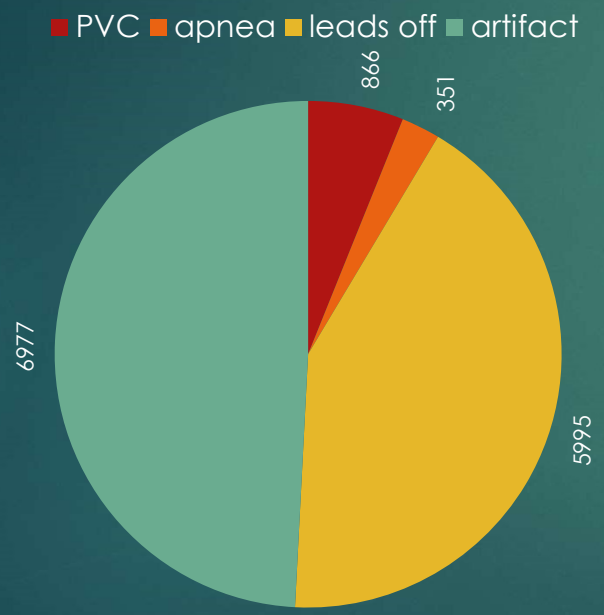
Baseline data

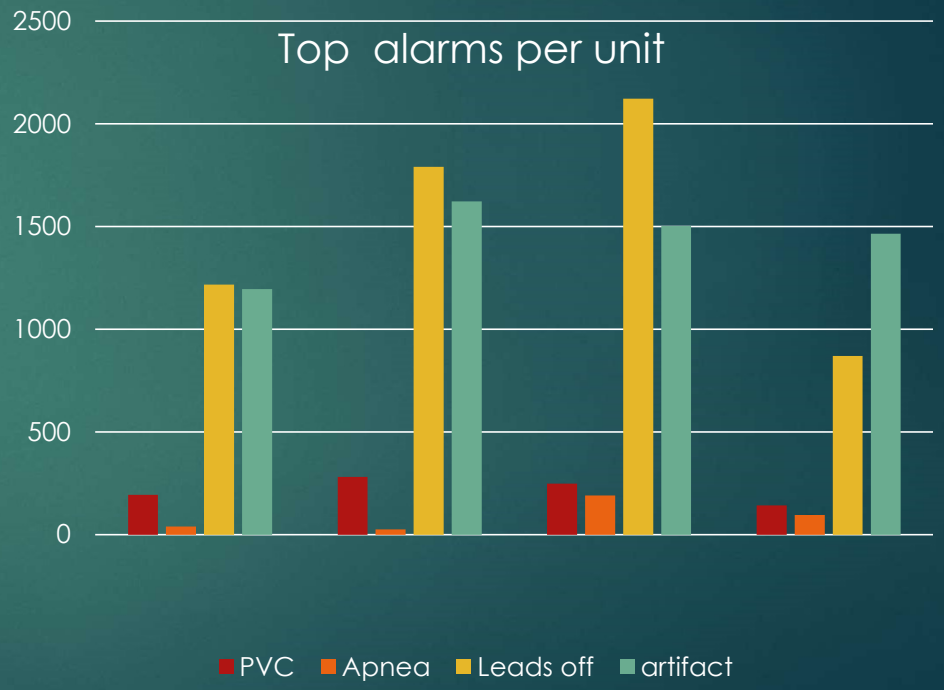
- 2014 aggregate alarm data was collected from servers via one time middleware consult
- Alarm burden in the pilot ICU was 80alarms/patient/day
- The most frequent alarms were **artifact** and **leads off**
- Default settings for arrhythmia and basic parameters determined by hospital leadership
- Policy defines terminology, responsibilities, and expectations for alarm safety.
- Nursing Standards of Care

Alarms in the adult ICUs, 2014



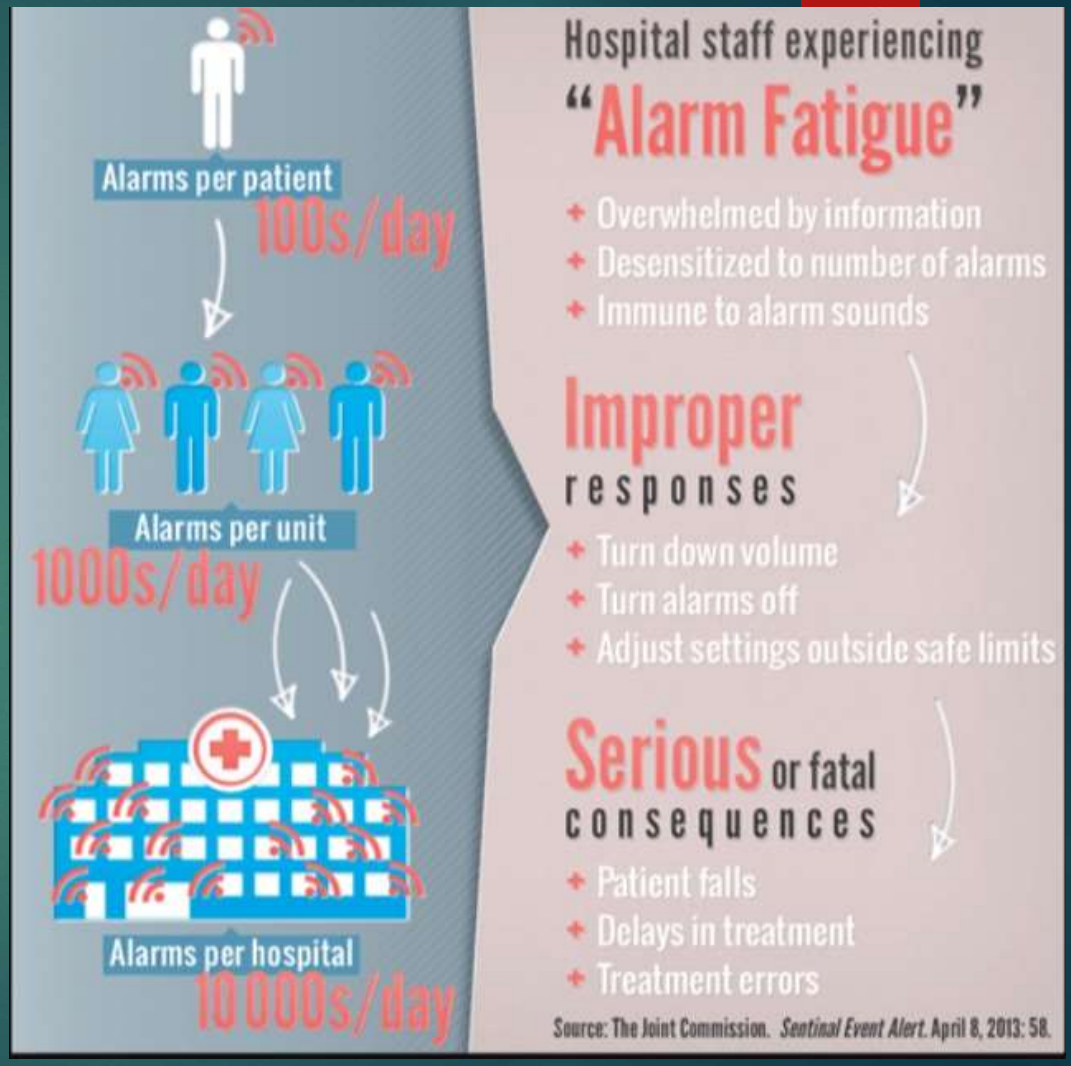
2014 RUMC alarm data





What is our current alarm burden?

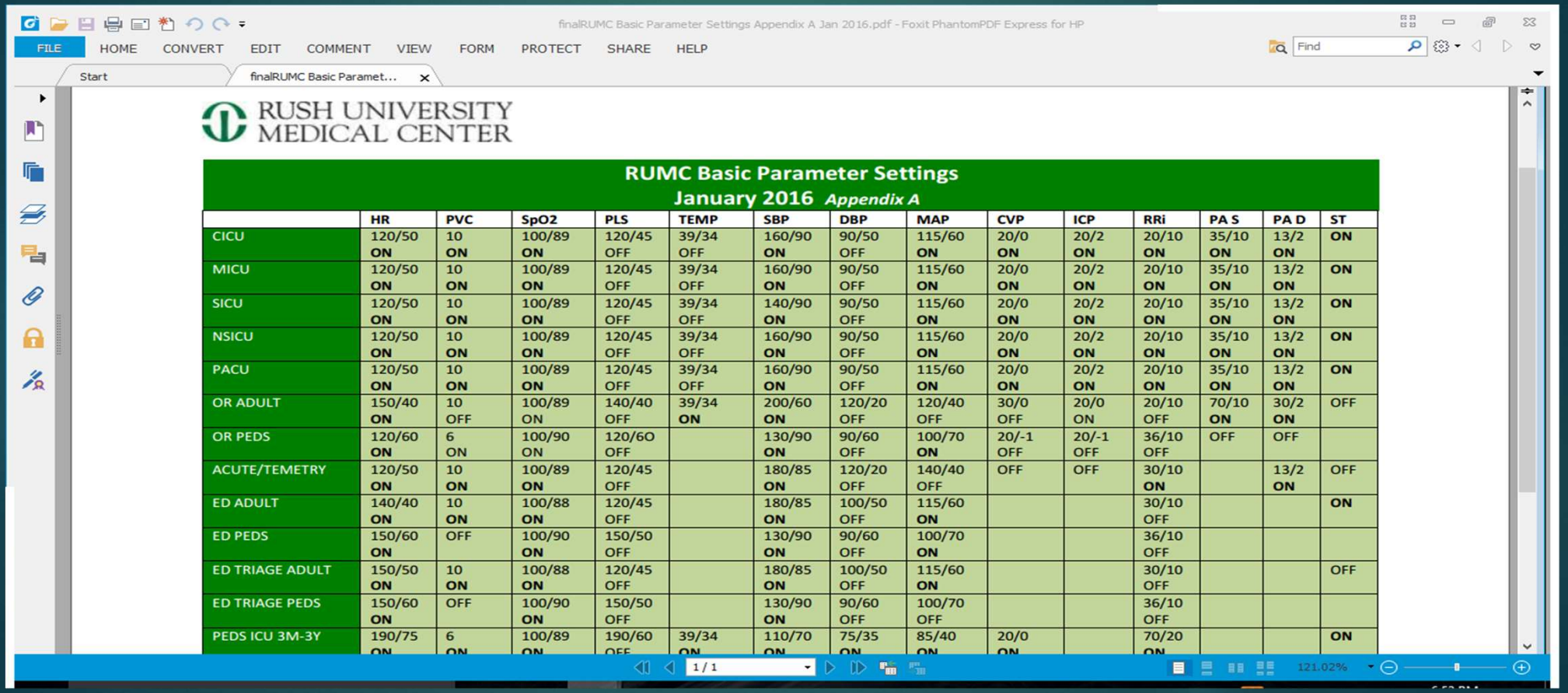
- This Joint Commission educational poster (2013) asserts that alarm burdens in excess of 100 per patient/day contribute to patient safety events. Alarms should be meaningful and signal an appropriate response.



Alarm Safety Surveillance Metrics

- Alarm burden: obtain # alarms/patient/day
- % of monitored patients with identifiers
- Frequency and types of customized limits
- Frequency of types of disabled alarms
- % of alarm safety documentation of leads changed q 24hr
- % monitoring identified in EHR

Organizational policy



finalRUMC Basic Parameter Settings Appendix A Jan 2016.pdf - Foxit PhantomPDF Express for HP

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Start finalRUMC Basic Paramet...

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RUMC Basic Parameter Settings
January 2016 ***Appendix A***

	HR	PVC	SpO2	PLS	TEMP	SBP	DBP	MAP	CVP	ICP	RRi	PA S	PA D	ST
CICU	120/50 **ON**	10 **ON**	100/89 **ON**	120/45 OFF	39/34 OFF	160/90 **ON**	90/50 OFF	115/60 **ON**	20/0 **ON**	20/2 **ON**	20/10 **ON**	35/10 **ON**	13/2 **ON**	**ON**
MICU	120/50 **ON**	10 **ON**	100/89 **ON**	120/45 OFF	39/34 OFF	160/90 **ON**	90/50 OFF	115/60 **ON**	20/0 **ON**	20/2 **ON**	20/10 **ON**	35/10 **ON**	13/2 **ON**	**ON**
SICU	120/50 **ON**	10 **ON**	100/89 **ON**	120/45 OFF	39/34 OFF	140/90 **ON**	90/50 OFF	115/60 **ON**	20/0 **ON**	20/2 **ON**	20/10 **ON**	35/10 **ON**	13/2 **ON**	**ON**
NSICU	120/50 **ON**	10 **ON**	100/89 **ON**	120/45 OFF	39/34 OFF	160/90 **ON**	90/50 OFF	115/60 **ON**	20/0 **ON**	20/2 **ON**	20/10 **ON**	35/10 **ON**	13/2 **ON**	**ON**
PACU	120/50 **ON**	10 **ON**	100/89 **ON**	120/45 OFF	39/34 OFF	160/90 **ON**	90/50 OFF	115/60 **ON**	20/0 **ON**	20/2 **ON**	20/10 **ON**	35/10 **ON**	13/2 **ON**	**ON**
OR ADULT	150/40 **ON**	10 OFF	100/89 ON	140/40 OFF	39/34 **ON**	200/60 **ON**	120/20 OFF	120/40 OFF	30/0 OFF	20/0 ON	20/10 OFF	70/10 **ON**	30/2 **ON**	OFF
OR PEDS	120/60 **ON**	6 ON	100/90 ON	120/6O OFF		130/90 **ON**	90/60 OFF	100/70 **ON**	20/-1 OFF	20/-1 OFF	36/10 OFF	OFF	OFF	
ACUTE/TEMETRY	120/50 **ON**	10 **ON**	100/89 **ON**	120/45 OFF		180/85 **ON**	120/20 OFF	140/40 OFF	OFF	OFF	30/10 **ON**		13/2 **ON**	OFF
ED ADULT	140/40 **ON**	10 **ON**	100/88 **ON**	120/45 OFF		180/85 **ON**	100/50 OFF	115/60 **ON**			30/10 OFF			**ON**
ED PEDS	150/60 **ON**	OFF	100/90 **ON**	150/50 OFF		130/90 **ON**	90/60 OFF	100/70 **ON**			36/10 OFF			
ED TRIAGE ADULT	150/50 **ON**	10 **ON**	100/88 **ON**	120/45 OFF		180/85 **ON**	100/50 OFF	115/60 **ON**			30/10 OFF			OFF
ED TRIAGE PEDS	150/60 **ON**	OFF	100/90 **ON**	150/50 OFF		130/90 **ON**	90/60 OFF	100/70 OFF			36/10 OFF			
PEDS ICU 3M-3Y	190/75 ON	6 ON	100/89 ON	190/60 OFF	39/34 ON	110/70 ON	75/35 ON	85/40 ON	20/0 ON		70/20 ON			**ON**

1 / 1 121.02%

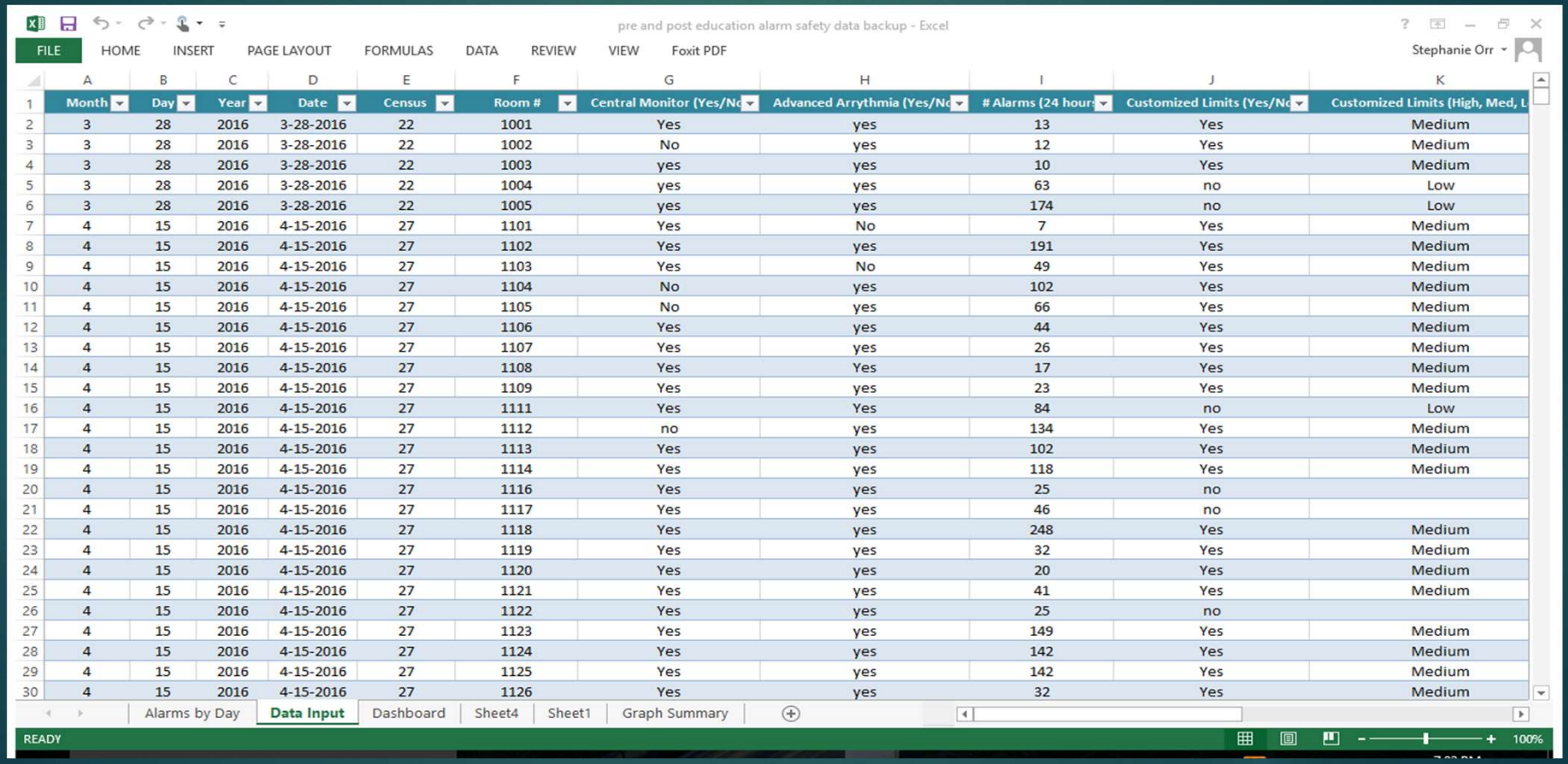
Data collection

- 8 Random shifts including nights and weekends
- Reviewed central station monitor event reports and EHR documentation for every patient on the unit during the data collection period
- Data points focused on measuring organizational policy points and basic alarm metrics
- Average census 25
- Avg time 12 hr per 100 cases
- Data collection occurred 1x/weekly over course 2 months

Method of obtaining alarm data

- Central station
- Each patient file reviewed for elements of alarm safety pertaining to organizational policy and procedure
- Customized limits are noted by level and type
- Surveillance included any disabled alarms
- Review number of alarms/patient/day via the stored alarm events for previous 24 hours to determine alarm burden
- EMR was audited for documentation of monitoring, alarms on, and lead changes

Alarm safety surveillance tool



pre and post education alarm safety data backup - Excel

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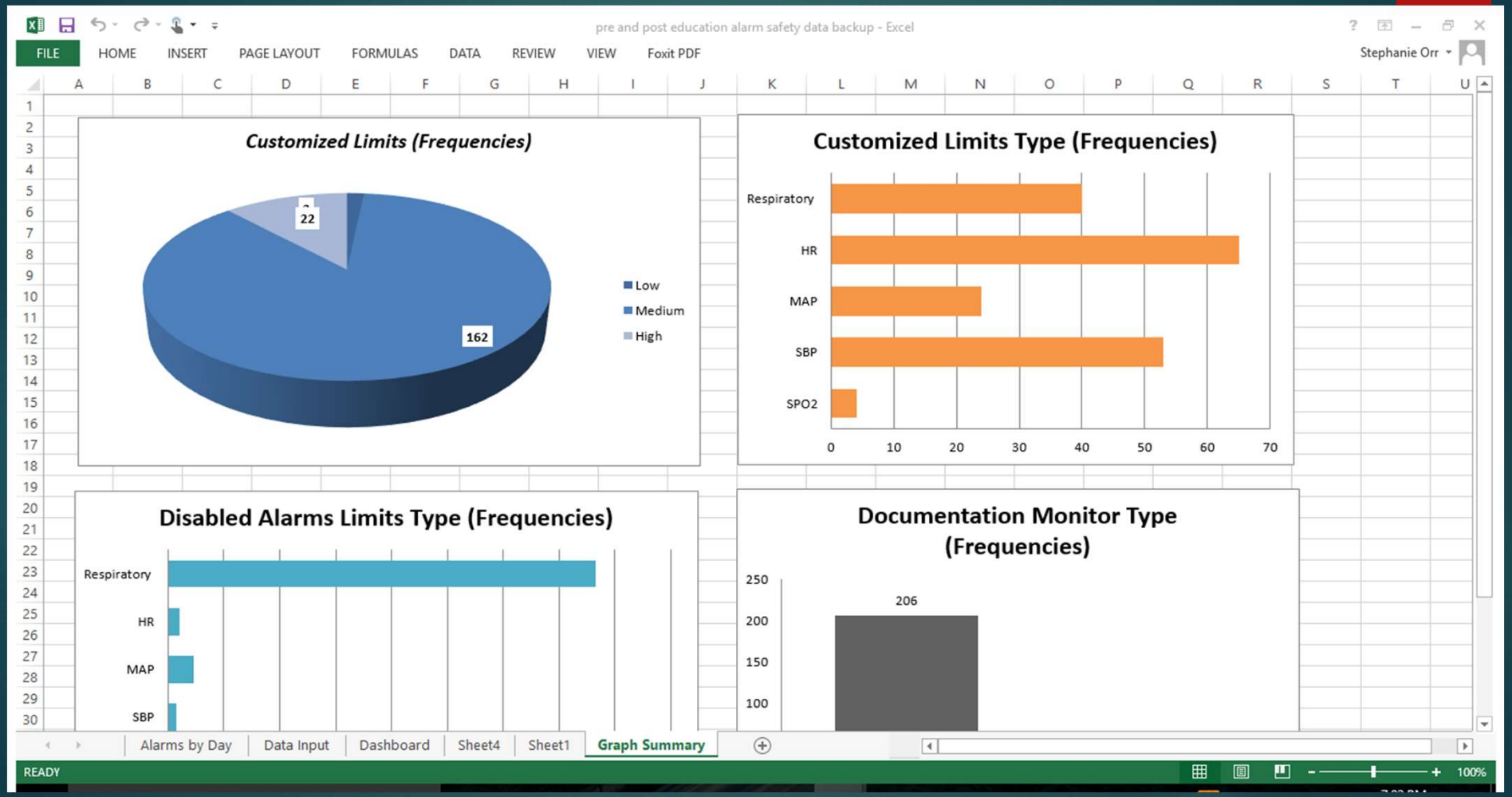
Stephanie Orr

	A	B	C	D	E	F	G	H	I	J	K
1	Month	Day	Year	Date	Census	Room #	Central Monitor (Yes/No	Advanced Arrythmia (Yes/No	# Alarms (24 hours	Customized Limits (Yes/No	Customized Limits (High, Med, L
2	3	28	2016	3-28-2016	22	1001	Yes	yes	13	Yes	Medium
3	3	28	2016	3-28-2016	22	1002	No	yes	12	Yes	Medium
4	3	28	2016	3-28-2016	22	1003	yes	yes	10	Yes	Medium
5	3	28	2016	3-28-2016	22	1004	yes	yes	63	no	Low
6	3	28	2016	3-28-2016	22	1005	yes	yes	174	no	Low
7	4	15	2016	4-15-2016	27	1101	Yes	No	7	Yes	Medium
8	4	15	2016	4-15-2016	27	1102	Yes	yes	191	Yes	Medium
9	4	15	2016	4-15-2016	27	1103	Yes	No	49	Yes	Medium
10	4	15	2016	4-15-2016	27	1104	No	yes	102	Yes	Medium
11	4	15	2016	4-15-2016	27	1105	No	yes	66	Yes	Medium
12	4	15	2016	4-15-2016	27	1106	Yes	yes	44	Yes	Medium
13	4	15	2016	4-15-2016	27	1107	Yes	yes	26	Yes	Medium
14	4	15	2016	4-15-2016	27	1108	Yes	Yes	17	Yes	Medium
15	4	15	2016	4-15-2016	27	1109	Yes	yes	23	Yes	Medium
16	4	15	2016	4-15-2016	27	1111	Yes	Yes	84	no	Low
17	4	15	2016	4-15-2016	27	1112	no	yes	134	Yes	Medium
18	4	15	2016	4-15-2016	27	1113	Yes	yes	102	Yes	Medium
19	4	15	2016	4-15-2016	27	1114	Yes	yes	118	Yes	Medium
20	4	15	2016	4-15-2016	27	1116	Yes	yes	25	no	
21	4	15	2016	4-15-2016	27	1117	Yes	yes	46	no	
22	4	15	2016	4-15-2016	27	1118	Yes	yes	248	Yes	Medium
23	4	15	2016	4-15-2016	27	1119	Yes	yes	32	Yes	Medium
24	4	15	2016	4-15-2016	27	1120	Yes	yes	20	Yes	Medium
25	4	15	2016	4-15-2016	27	1121	Yes	yes	41	Yes	Medium
26	4	15	2016	4-15-2016	27	1122	Yes	yes	25	no	
27	4	15	2016	4-15-2016	27	1123	Yes	yes	149	Yes	Medium
28	4	15	2016	4-15-2016	27	1124	Yes	yes	142	Yes	Medium
29	4	15	2016	4-15-2016	27	1125	Yes	yes	142	Yes	Medium
30	4	15	2016	4-15-2016	27	1126	Yes	yes	32	Yes	Medium

Alarms by Day | Data Input | Dashboard | Sheet4 | Sheet1 | Graph Summary

READY 100%

Alarm safety practice trends




RRi /min
25
SpO2 %
PLS
80
100
PI
0.12
Low perfusion
NIBP mmHg
34 min ago
160
90
84/43
(63)
115
60
auto
60 min
Setup

Staff Education: Key Points

- Introduce evidence based practice
- Highlight organizational policy
- Time and content for staff education is kept brief
- Utilize visual reminders of alarm safety in staff areas
- Evidence of learning is evaluated by quiz and alarm safety surveillance data


Safety matters

RUSH

AMERICAN ASSOCIATION of CRITICAL-CARE NURSES

AAMI

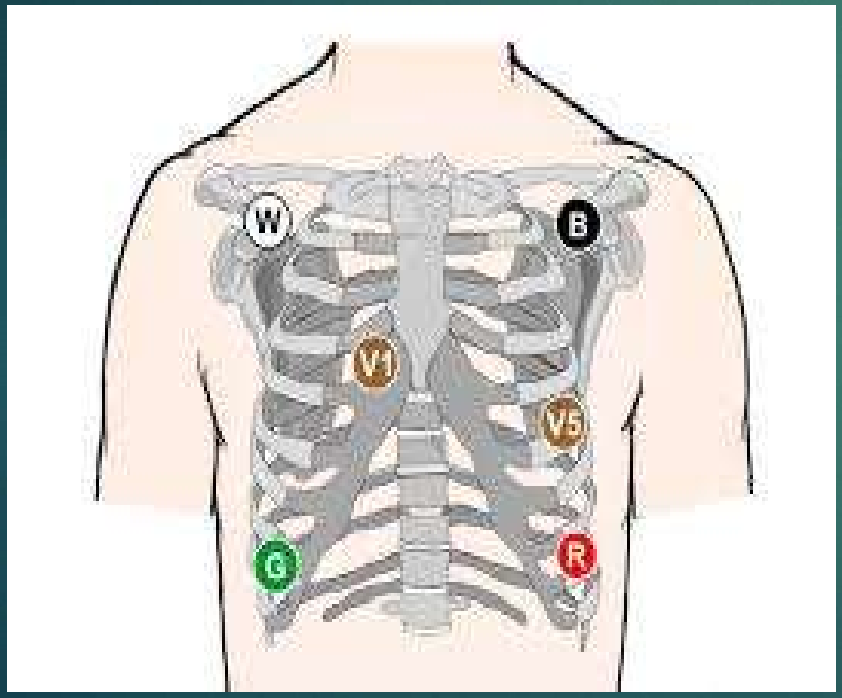
Advancing Safety in Healthcare Technology

AAMI FOUNDATION

AACN Alarm Management Guidelines

- **Collect alarm data** including: alarm type, frequency, and reasons why alarm sounded
- Conduct observations of how alarms are managed on a individual units**, identify trends and safety concerns.**
- Identify the goal or outcome measures that will guide quality improvement.
- **Implement proactive strategies that include: proper skin prep & lead placement, daily lead changes, customize limits for individual patient parameters as determined by patient condition and treatment goals.**
- Provide ongoing staff education and support about alarm enabled patient care equipment and alarm safety.
- Develop patient care unit policies and protocols that address acceptable alarm safety strategies for clinical monitors.

Alarm Safety Staff Education



Evaluation: pilot project practice metrics

Metric	pre	post
Alarm burden	80	59
% patient identifiers	94%	92%
% correct setting	96%	98%
% customized limits	84%	89%
% disabled alarms	91%	71%
% leads changed	10%	40%

Pilot project outcomes and conclusions

- The pilot project improved alarm safety practice trends.
- 97% of cases had the correct setting
- 84% of cases had customized limits.
- 20% decrease in disabled alarms.
- 27% decrease in alarm burden.
- 30% increase in documentation for changing leads
- The pilot project identified practice trends that inspired further discussion and future quality initiatives.

Recommendations

- Include alarm burden and surveillance of practice trends as part of the organizational alarm safety strategy.
- Include review of alarm safety policy and practice expectations in annual staff training requirements.
- Include basic alarm safety metrics in unit based quality reports as feedback to staff.
- Promote alarm safety as part of the general culture of safety and reinforce with visual reminders.

Implications for advancing alarm safety

- Policy & default parameters
- Defining customization
- Analyzing alarm floods
- Establishing an alarm safety routine for QI
- Enhancing culture of safety: rounds and bedside report
- Noise levels and the evidence for “quiet time”

References

- Sendelbach, S. & Funk, M., (2013) Alarm fatigue: A patient safety concern. **AACN Advanced Critical Care**, 12(4), October/December 2013, p 378-386. doi: 10.1097/NCI.0b13e3182a903f9
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