

**December 12, 2016  
12pm to 1pm**

**From the National Coalition for Alarm Management  
Safety  
A case study from Sentara Healthcare**

***“The Journey of Intelligent Alarm Management in a  
NICU”***

**Presenters: Greg Walkup, Director, IT  
Nikki M. Lowery, BSN, RNC-NIC**

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# A Special Thanks



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# **Sentara Healthcare**

## **Reducing Alarm Fatigue By Improving Alarm Notification Rules**

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Sentara Princess Anne Hospital

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December 2016

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# OVERVIEW OF SENTARA

- 12 acute care hospitals with more than 100 sites of care throughout Virginia and northeastern North Carolina and beyond.
- Not-for-profit system includes advanced imaging centers, nursing and assisted-living centers, outpatient campuses, physical therapy and rehabilitation services, home health and hospice agency, a 3,800-provider medical staff and four medical groups.
- Medical transport ambulances and Nightingale air ambulance, and we extend health insurance to 450,000 people through Optima Health



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# Our Sentara Princess Anne Hospital NICU Journey

- Relocation of Women's Health from Sentara Virginia Beach Hospital
- Transition from Open Bay NICU to Private/Semiprivate Rooms
- SPAH NICU opened in August 2011
- 20 beds including 4 private rooms and 8 "twin" rooms
- Specialty level NICU managing neonates of all gestational ages with 24/7 neonatology coverage



# NICU Alarm Management Overview

- Initial Design and Alarm Management
- Collaboration of Systems
- Primary vs Secondary Alarms (The Marble Effect)
  - Vital signs are displayed via Phillips Monitors. Alarm settings are managed by predetermined parameters.
  - Extension Middleware routes critical alarms from the Phillips Monitor to the CISCO wireless phones
  - The alerts are announced with a custom alert-tone and display as a txt-type message that an alarm parameter has been breached



# A National Challenge-Alarm Fatigue

- Alarm fatigue is a serious health care safety issue
- The Joint Commission mandates action items for Alarm Fatigue in January 2016
- How bad can it be (nationally). . .
  - 1 alarm every 90 seconds
  - 942 alarms each day
  - 90% unanswered
  - 216 deaths



*“This is alarm fatigue. The point when hospital personnel have become so inundated with alarms that alerts are missed or response is delayed” Sincox and Nault, 2014*



# Patient Safety First

- *Which alarms are sent to the phones?*
- *When and how are alarms escalated?*
- *What is the greatest challenge?*
- *Do the nurses feel that the patients are safe?*

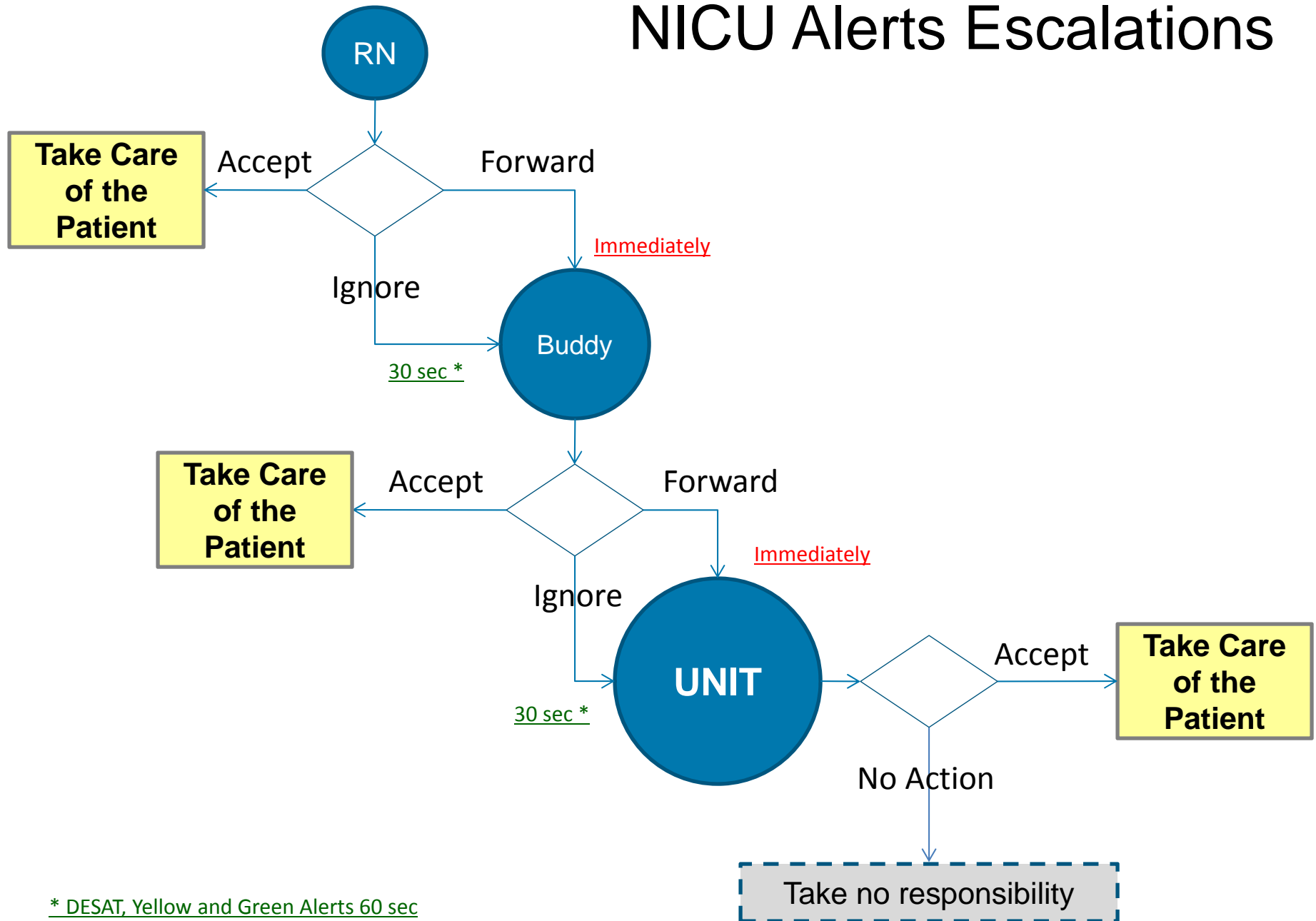




# List of Critical Alerts for SPAH NICU

Device	Ringtone	Alert To the Phone	1st Level Responder	Time to Escalate	2nd Level Responder	Time to Escalate	3rd Level of Responder
<b>Philips Monitor</b>	"Monitor Red Alert" 	ASYSTOLE	RN	30 sec	Buddy RN	30 sec	All Unit Phones
		EXTREME BRADY	RN	30 sec	Buddy RN	30 sec	All Unit Phones
		DESAT	RN	60 sec	Buddy RN	60 sec	All Unit Phones
<b>G5 Ventilator</b>	"Vent Red Alert" 	LOW MINUTE VOLUME	RN	30 sec	Buddy RN	30 sec	All Unit Phones
			RT Staff	30 sec	Secondary RT	30 sec	All RT Phones
		PATIENT DISCONNECTED	RN	30 sec	Buddy RN	30 sec	All Unit Phones
			RT Staff	30 sec	Secondary RT	30 sec	All RT Phones
		VENT DISCONNECTED	RN	30 sec	Buddy RN	30 sec	All Unit Phones
			RT Staff	30 sec	Secondary RT	30 sec	All RT Phones
		INSPIRED GAS FAILED	RN	30 sec	Buddy RN	30 sec	All Unit Phones
			RT Staff	30 sec	Secondary RT	30 sec	All RT Phones
Device	Ringtone	Alert To the Phone	1st Level Responder	Time to Escalate	2nd Level Responder	Time to Escalate	3rd Level of Responder
<b>Philips Monitor</b>	"Monitor Yellow Alert" 	SpO2 HIGH	RN	60 sec	Buddy RN	60 sec	All Unit Phones
		ABPs HIGH	RN	60 sec	Buddy RN	60 sec	All Unit Phones
		ABPs LOW	RN	60 sec	Buddy RN	60 sec	All Unit Phones
Device	Ringtone	Alert To the Phone	1st Level Responder	Time to Escalate	2nd Level Responder	Time to Escalate	3rd Level of Responder
<b>Philips Monitor</b>	"Monitor Green Alert" 	SpO2 SENNSOR OFF	RN	60 sec	Buddy RN	60 sec	All Unit Phones
		ECG LEADS OFF	RN	60 sec	Buddy RN	60 sec	All Unit Phones

# NICU Alerts Escalations



\* DESAT, Yellow and Green Alerts 60 sec

# NICU Clinical Alerts - Initial Acceptance and ....Later feedback

- System worked as designed
- Some specific additional Training needs
- Staff very quickly dependent on system
- Later realized staff were contributing to alarms
- Automatic escalations worked great but introduced a new issue

# The Alarm Challenge in our NICU

- For the month of March 2016 we had 8,117 events
- Which lead to 16,450 alarm notifications
- Slowest day= 82 events with 115 notifications
- Busiest day = 786 events with 1468 notifications
- These alarms lead to:
  - *Noise for neonates, families and caregivers*
  - *Multiple and duplicate alarms*
  - *Interruptions in Care*
  - *Staff frustration*
  - *Patient safety*



## We wanted to know. . .

- Conducted a survey in the SPAH NICU
- Participants were 36 full and part time staff
- Survey was completed Pre-intervention and 30 days Post intervention



# NICU Alarm Management Survey: Sentara Princess Anne Hospital

- Do you feel that the alarms coming to your phones are safe for your patients?
- Rate your satisfaction with the current alarm system.
- How often do you experience alarm fatigue during a shift in the NICU?
- What percentage of the primary alarms that come to your phone are necessary?
- What percentage of the escalated alarms coming to your phone are necessary?
- Would you like to see a change in the NICU alarms that come to your phone? What change would you like to see?



# And the staff shared. . .

“. . . Vent alarms are **TOTALLY OBNOXIOUS** and  $\frac{3}{4}$  of the alarms mean nothing to the RN”

“Less alarms when you are in the patients room caring for the infant. **IT IS A DISTRACTION WHEN YOU ARE IN A CRITICAL SITUATION**”

“I would like to be able to **burp a baby without the alarms screaming at me** and not allowing me to burp for longer than 30 seconds with stopping and getting up”

“It is frustration when you are in the room and the alarms are coming to your phone. . . I have to interrupt care of the patient to respond to the phone. Then I have to wash my hands again. This alone causes me to get behind in patient assessments and feedings. **It also encourages me to ignore the alarm.**”



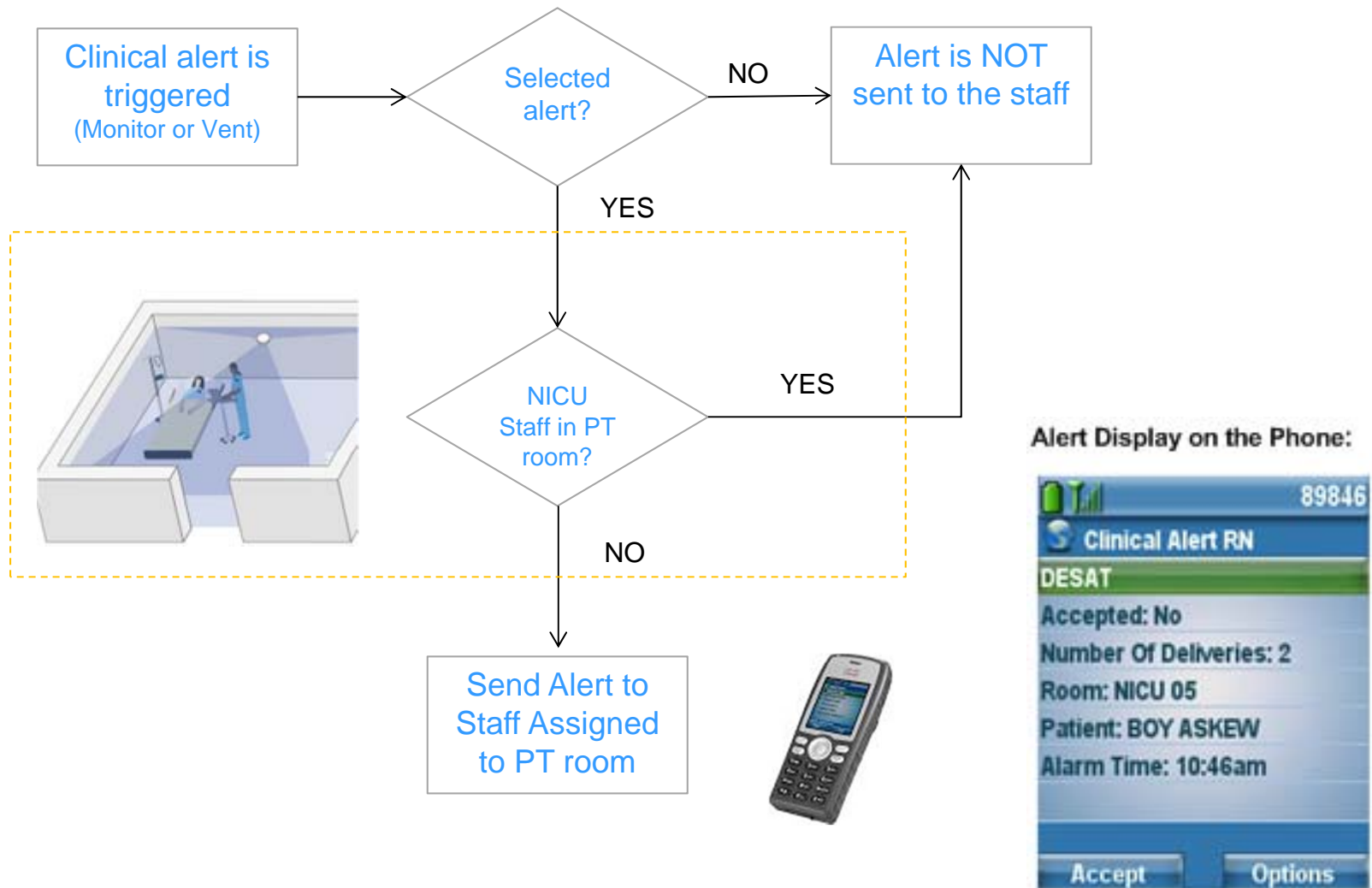
# Intervention for SPAH NICU

- Collaboration and Planning
- Physical, technological and staff changes in preparation
- Leadership and financial support
- Design and Implementation

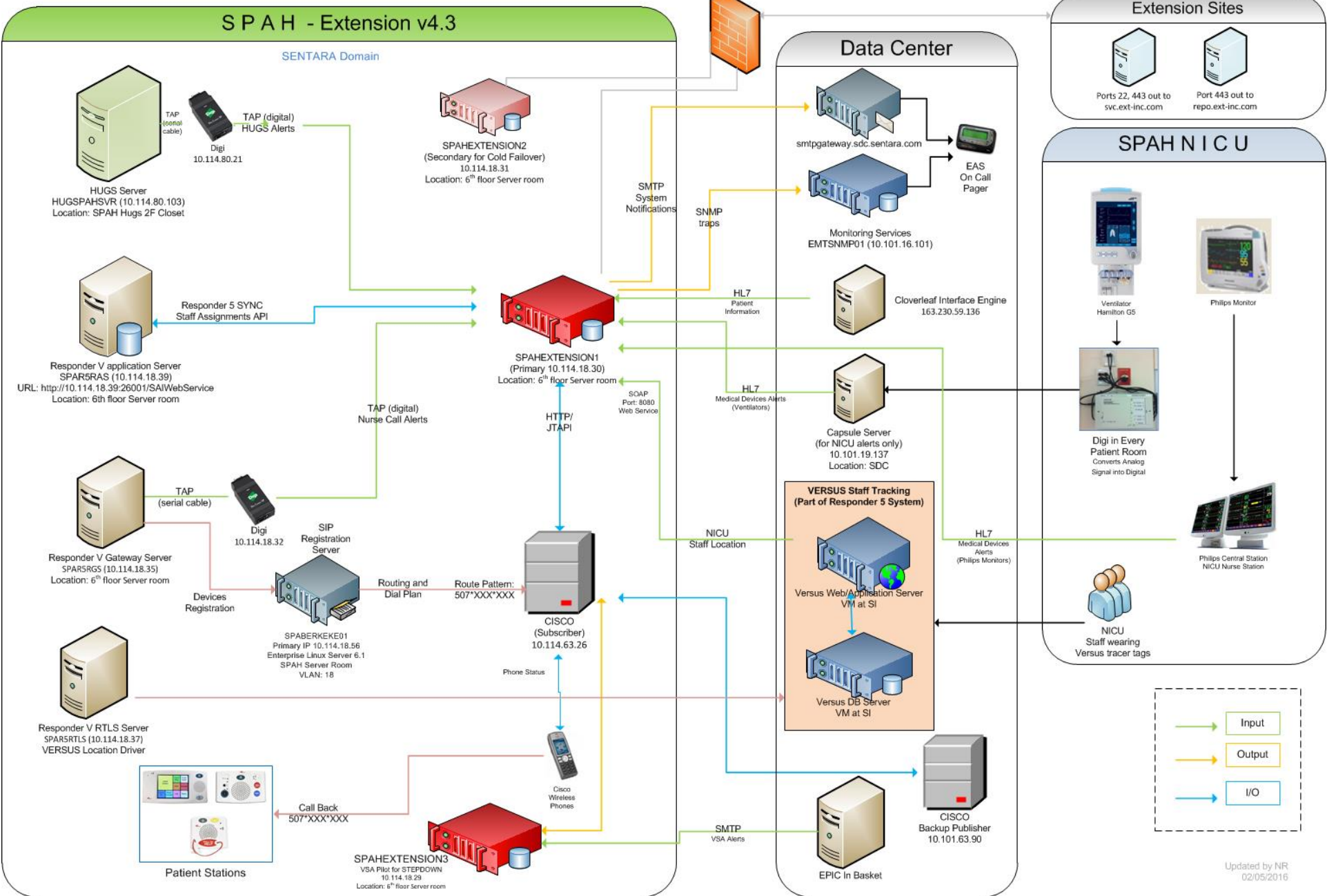




# NICU Clinical Alerts – Suppression Algorithm



# SPA H Middleware Interfaces with Cisco Phones



# Post Survey Results

- Reduction in duplicative alarms by 54%



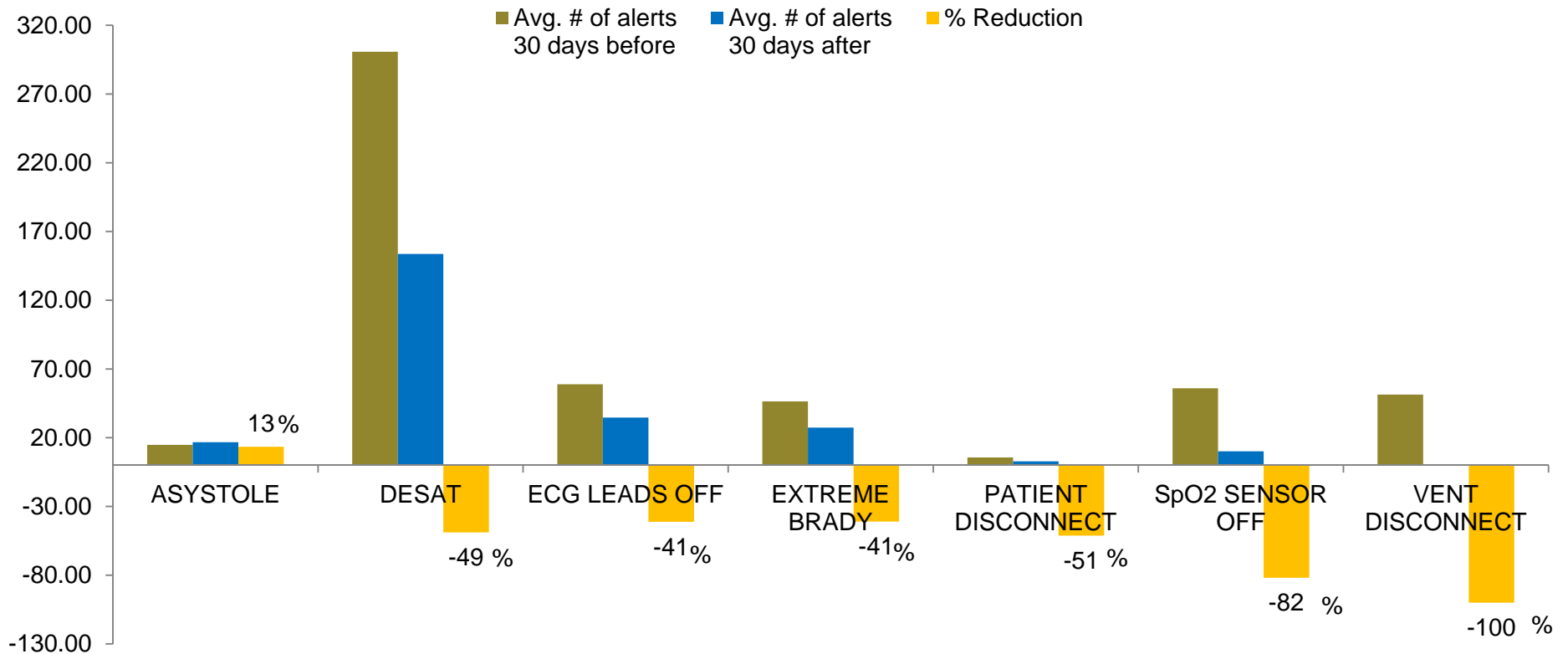
- Increase in staff satisfaction of alarms management system to 94%
- RN driven or nuisance alarms such as suctioning (vent disconnect) or sensor changes (SpO2 sensor off) were observed to have the greatest change



# Preliminary Data Analysis

## Initial total results of 54% reduction in alerts

	ASYSTOLE	DESAT	ECG LEADS OFF	EXTREME BRADY	PATIENT DISCONNECT	SpO2 SENSOR OFF	VENT DISCONNECT
Avg. # of alerts 30 days before	14.73	300.79	58.85	46.42	5.64	55.94	51.37
Avg. # of alerts 30 days after	16.71	153.66	34.59	27.37	2.75	10.14	
<b>% Reduction</b>	<b>13</b>	<b>-49</b>	<b>-41</b>	<b>-41</b>	<b>-51</b>	<b>-82</b>	<b>-100</b>



# Alarm Management Overview

- Using customized audible alarms (ringtones enunciating alert type)
- Med-Admin Nurse Call feature


# Using Customized Audible Alarms

## Initial Design:

- Collaborative Efforts
- Several ringtone options
- Approval from Hospital Administration
- Final ringtone:
  - Enunciating message
  - Background sound
  - Number of repeats

# Using Customized Audible Alarms

Some examples:

- Monitor or Ventilator alerts 
- Bed Exit
- Staff Assist
- Bath Emergency
- HUGS critical alerts (Infant Protection System)

# MED ADMIN – Nurse Call Setup



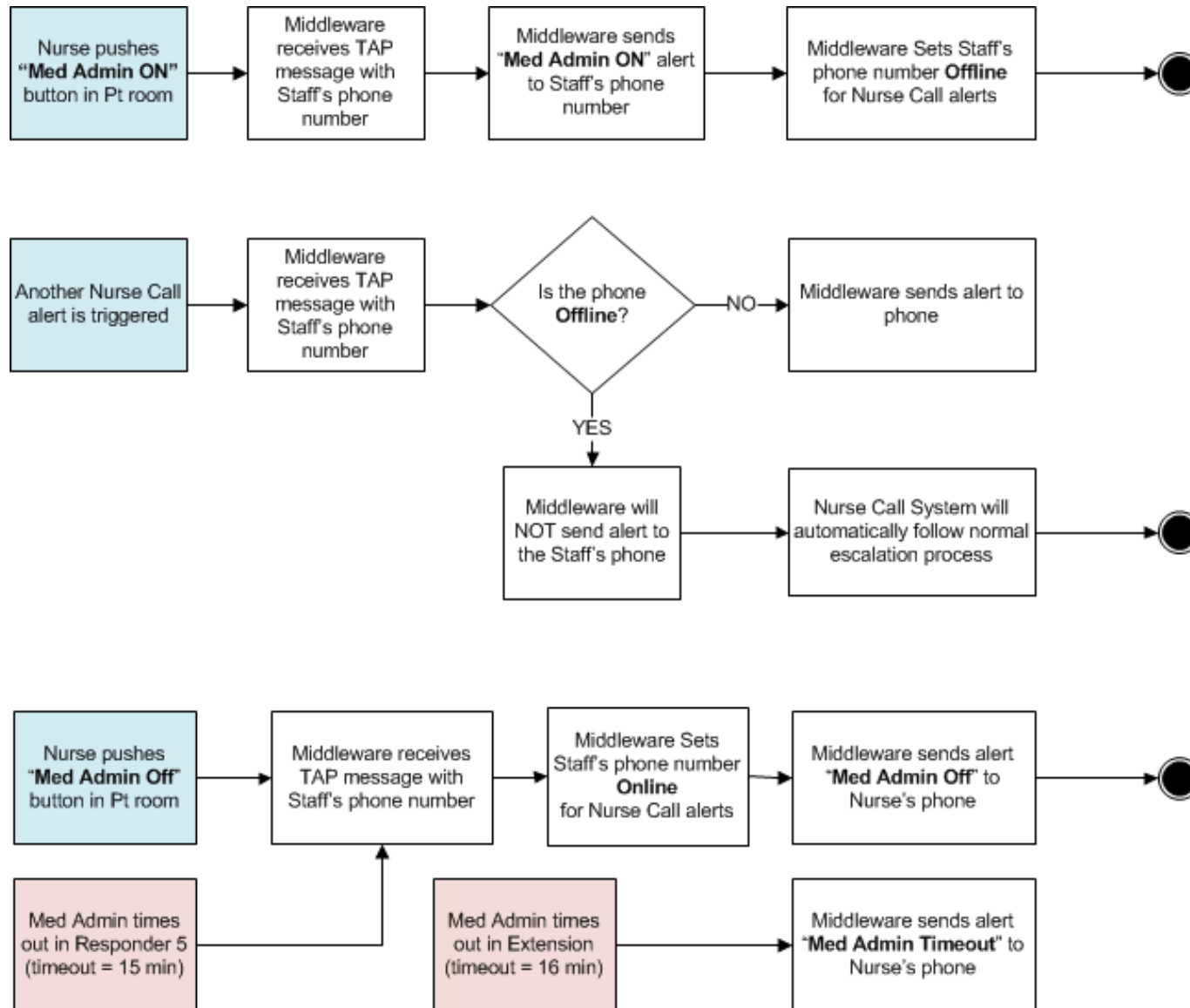
*Patient Station – Med Admin buttons*



*Dome Light – Med Admin colors*



# MED ADMIN Feature



# End of Presentation

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