MED EXPIRATION REMINDERS USING CUREATR AND AGENT PHASE I - ALERT VALIDITY AND UTILITY (CASE-LEVEL)

Executive sponsors: Neil Fishman, Bill Hanson, Roy Rosin

Clinical Champion: Bill Schweickert MD

Users: Interns and residents, and attendings on Martin services rotating through Founders 12/14.

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Supporting partners:
(Martin 2): Jeff Greenblatt
(Martin 4): Jodi Savitz
(Martin 5): Kai Xu
Jennifer Myers MD
Neha Patel MD

Timeframe:
June 4 - June 17 (2 weeks during continuous resident block)

STUDY DESIGN

Goals:

1. Determine utility of a mobile alert to cause reordering when previously forgotten. Collect cases where 'near forgotten' medications were reordered.
2. Evaluate the utility of an opt-in mobile alert with unique timing, user specificity, and use in workflow, when received concurrently with standard EMR flags and reminders.

Control:

Martin team 2, 4, 5 in week prior to receiving alerts
Martin team 1, 3, 6 during study period

Intervention group:

Martin team 2, 4, 5

Duration:

6/4/15 - 6/17/15 (two weeks)

Need/Use-case:

15 med expiration-related errors in last 6 months, as self-reported in SafetyNet

3 adverse events highlighted at April Grand Rounds

INVITED TO TEST

3 MARTIN TEAMS:

3 ATTENDINGS
3 RESIDENTS
6 INTERNS
6 MED STUDENTS

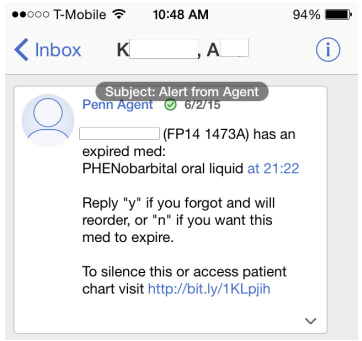
OPTED-IN FOR ALERTS

1 ATTENDING
2 RESIDENTS
6 INTERNS
2 MED STUDENT

ACTUALLY RECEIVED ALERTS

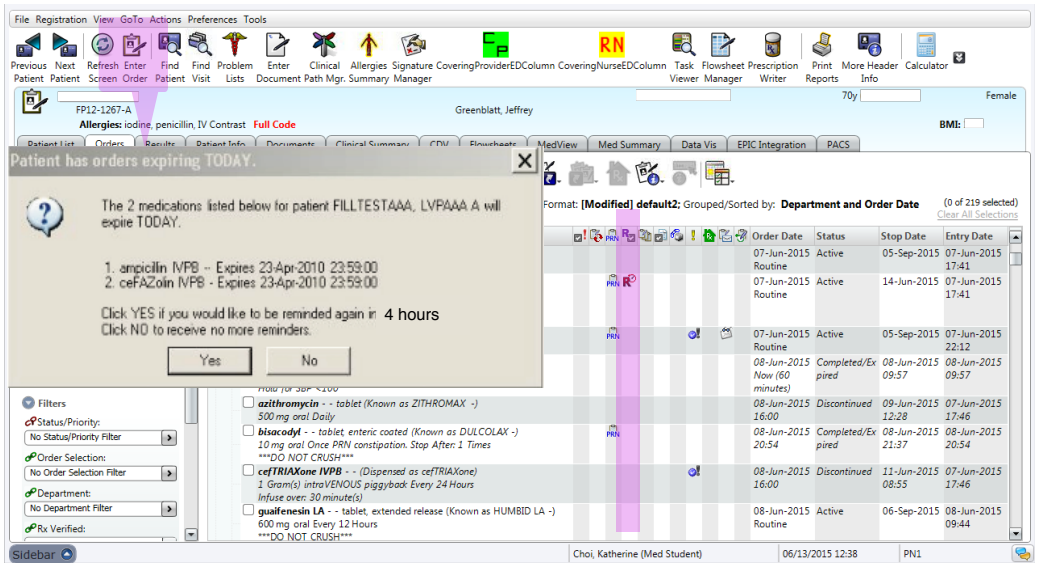
1 ATTENDING
4 INTERNS
1 MED STUDENT
(1-2 ALERTS EACH)

Agent alert



Reminder that medication has just expired and may need reordering
- Fires AT time of expiration
- Excludes medications with duration < 3 days, and antibiotics with duration < 6 days
- Sent to: Covering provider, resident, and/or attending (all opt-in)

Current state



48 hrs prior to expiration, flag appears on orders view for each patient

12 hrs prior to expiration for medications with 7 day automatic stop dates (antibiotics and controlled substances), when provider clicks "new orders" button, a pop up window appears. Alert tells providers which medications are expiring that day, and will give them the option to be reminded again in 4 hours or not.

SILENT after medication has expired

RESULTS

Baseline (pre-intervention):

Martin team 2, 4, 5 in week prior to receiving alerts

6/1/15 fentanyl patch q72 expired	not reordered as of 6/13	was home medication that was administered while in the hospital
6/2/15 21:00 clindamycin 600mg q8hr expired	reordered 6/2/15 11:38.	1 dose missed
6/2/15 21:22 phenobarbitol q8hr expired	reordered 6/3/15 11:06	1 dose missed

Martin team 1, 3, 6 during study period

6/13/15 09:00 prednisone	intended to let it expire	

Intervention group:

*(**forgotten meds in bold,** meds intended to expire in regular font)*

6/6/15 21:30 cefepime IVpb	intended to let it expire	
6/7/15 09:55 valacyclovir q24hr	**reordered 4 min after receiving alert**	**no doses missed**
6/8/15 21:30 hydromorphone q24hr	**fired when off duty, reordered 8am next morning**	**no doses missed**
6/9/15 12:23 prednisone	intended to let it expire	
6/10/15 22:01 phenobarbital q8hr	**reordered 30 min after receiving alert, resident was planning on ordering the next morning but decided to put in when alert prompted.**	**no doses missed**
6/14/15 09:10: prednisone	intended to let it expire	

7 alerts fired over the course of the validation test:

- 3 were medications that had truly been forgotten (confirmed by direct f/u) and were reordered in response to the alert.
- 4 were medications meant to expire but the reminder was not intrusive to them and not a cause of alert fatigue.

In one case, the medication (phenobarbital q8hr) was reordered in response to the alert within 30 minutes of expiration, and no doses were missed. *7 days earlier, prior to receiving alerts* — the same medication was reordered 14 hours after expiration, and a dose was missed in that interim.

DISCUSSION

Lessons learned:

Alert delivered at time of expiration was effective in reminding residents about medications that were truly forgotten and reordered before any doses were missed, when delivered concurrently with existing sunrise reminder alerts.

3 cases were caught on 3 medicine services over two weeks.

This is potentially an underestimate of true occurrence frequency due to Hawthorne effect during test period.

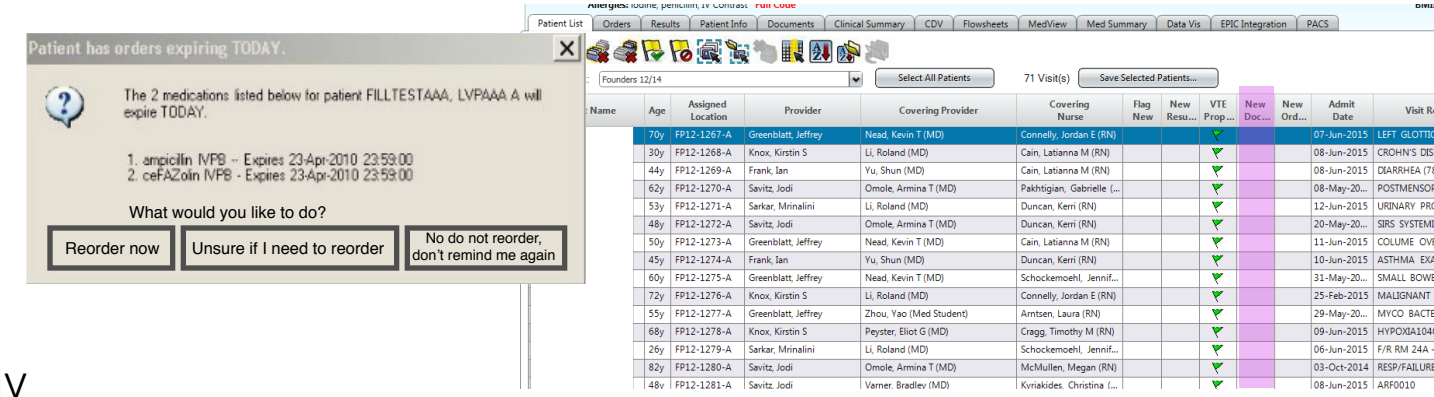
(In the week prior to intervention, there were 3 cases that would have been caught by the alert. 2 of these resulted in delayed reordering causing a dose missed in the interim.)

DISCUSSION

Opportunities for improvement of SCM alert:

1. Show flag on Service view column rather than on patient-specific Orders page "review status" column. Keep blue = 48hrs prior to expiration, red = 24hrs prior.
   —> Would be more amenable to systematic review at end of shift, as it occurs in current work flow.

2. Improve choice architecture on pop-up menu 12 hr prior to expiration: Y/N should designate reordering action, rather than re-alerting action.
   ex: Reorder now // Unsure if I need to reorder // No, do not reorder, don't remind me again



Mobile alert could:

1. be added concurrently
   —> would act as safety net, by firing at time of expiration

2. replace pop-up completely
   —> pros: improves work flow & does not interrupt task at hand (e.g. ordering separate medication) and enables alerts *after* medication has expired (currently SCM alerts fall off after medication has expired)
   —> cons: does not enable reordering by one click

TRIGGERING PROVIDER ORDERING USING AGENT AND CUREATR

Executive sponsors: Bill Hanson, Roy Rosin

Clinical Champion: Barry Fuchs MD

Users: Residents rotating through MICU. Will be set up by Eugene in person during MICU orientation (residents already have cureatr installed).

Contacts:
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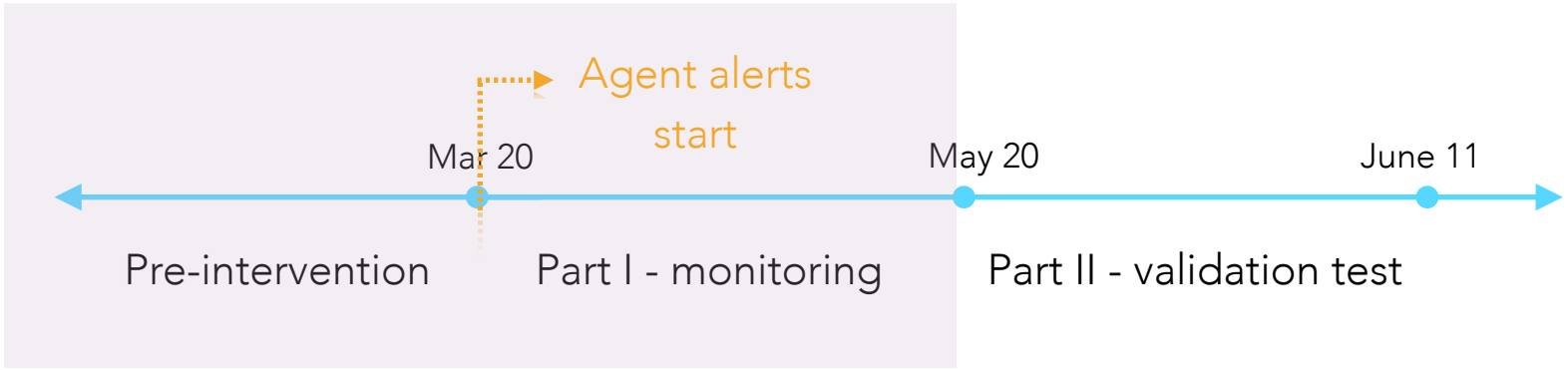
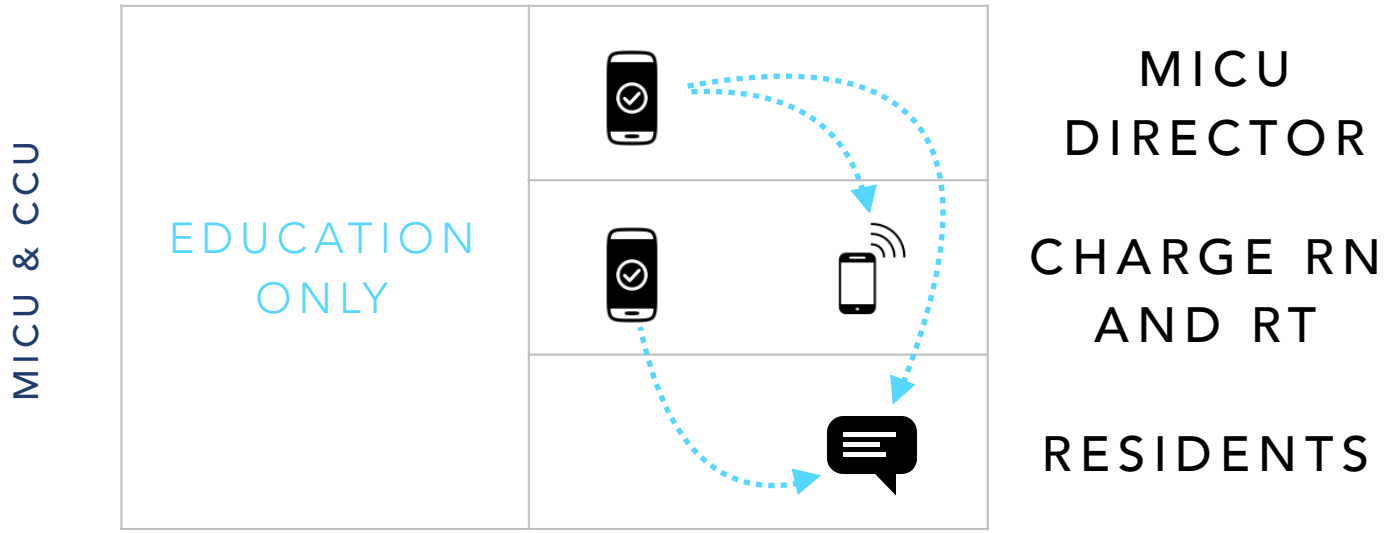
Leri, Damien <damien.leri@uphs.upenn.edu>
Choi, Katherine <katherine.choi@uphs.upenn.edu>

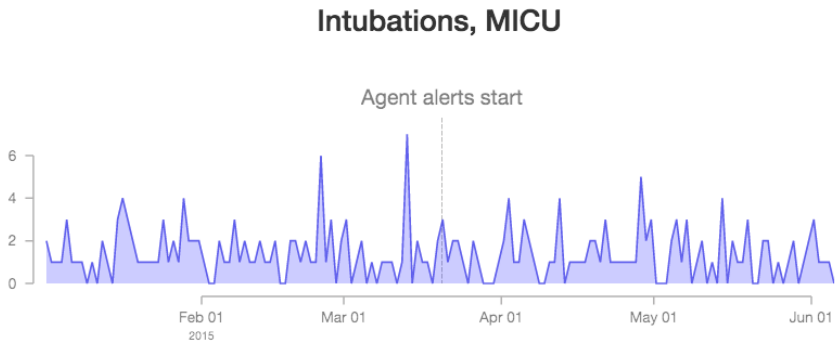
Supporting partners:
Ian Oppenheim MD
Jason Maley MD

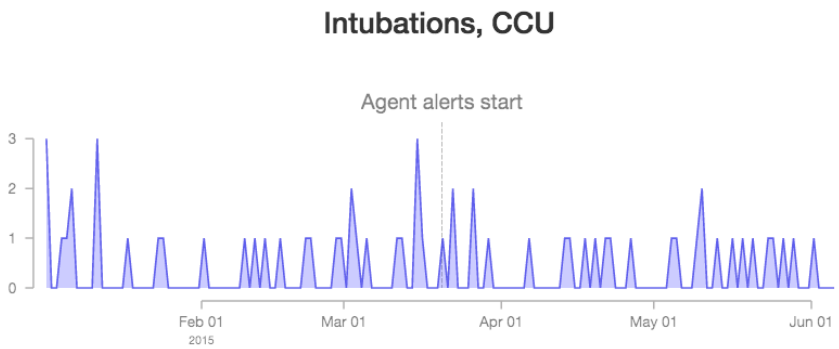
Timeframe: May 18 - June 11

Goals:
- Achieve 100% compliance of ordering the post-intubation order set after ventilations. This accomplishes the screening protocol for extubation risk.
- For patients with positive extubation risk, 100% compliance with extubation risk work- flow.
- Distal goal: decrease extubation emergencies which are associated with morbidity and mortality

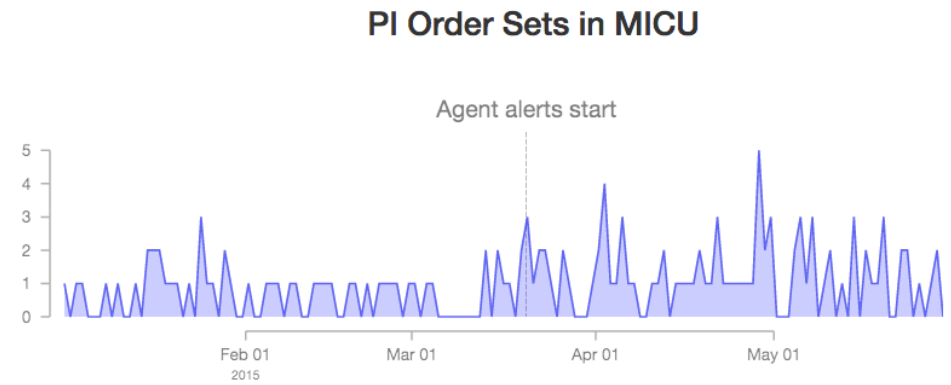

Agent alerts start
Mar 20
May 20
June 11
Pre-intervention
Part I - monitoring
Part II - validation test

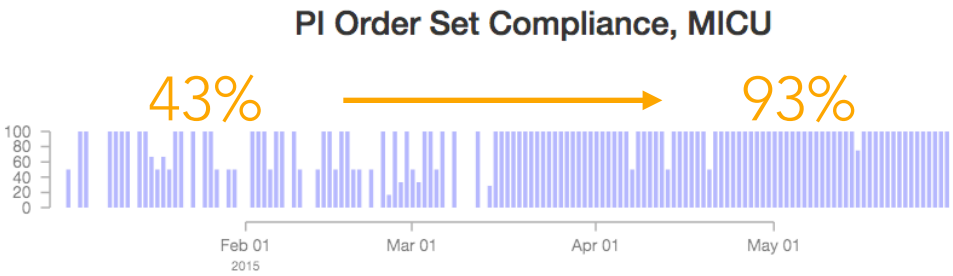

MICU & CCU
EDUCATION ONLY
MICU DIRECTOR
CHARGE RN AND RT
RESIDENTS





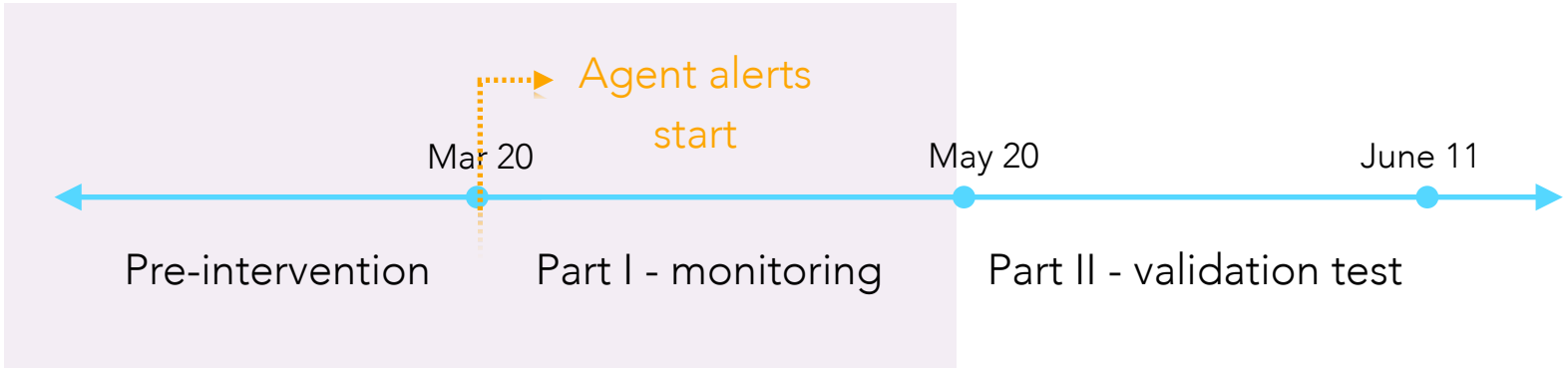
The number of intubations occurring was comparable before and after intervention.

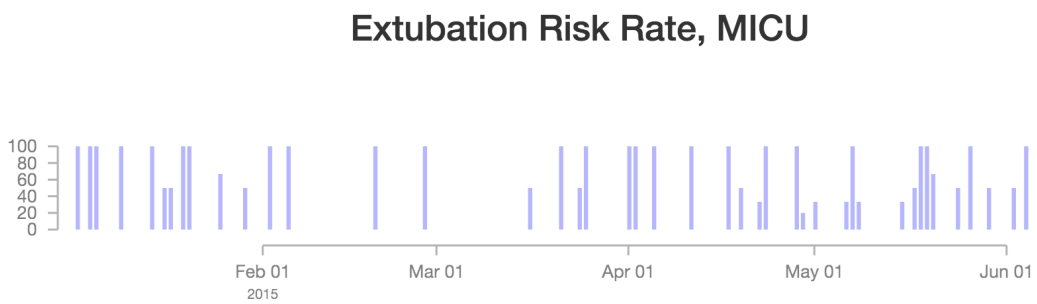




Before:
43 intubations
17 order sets

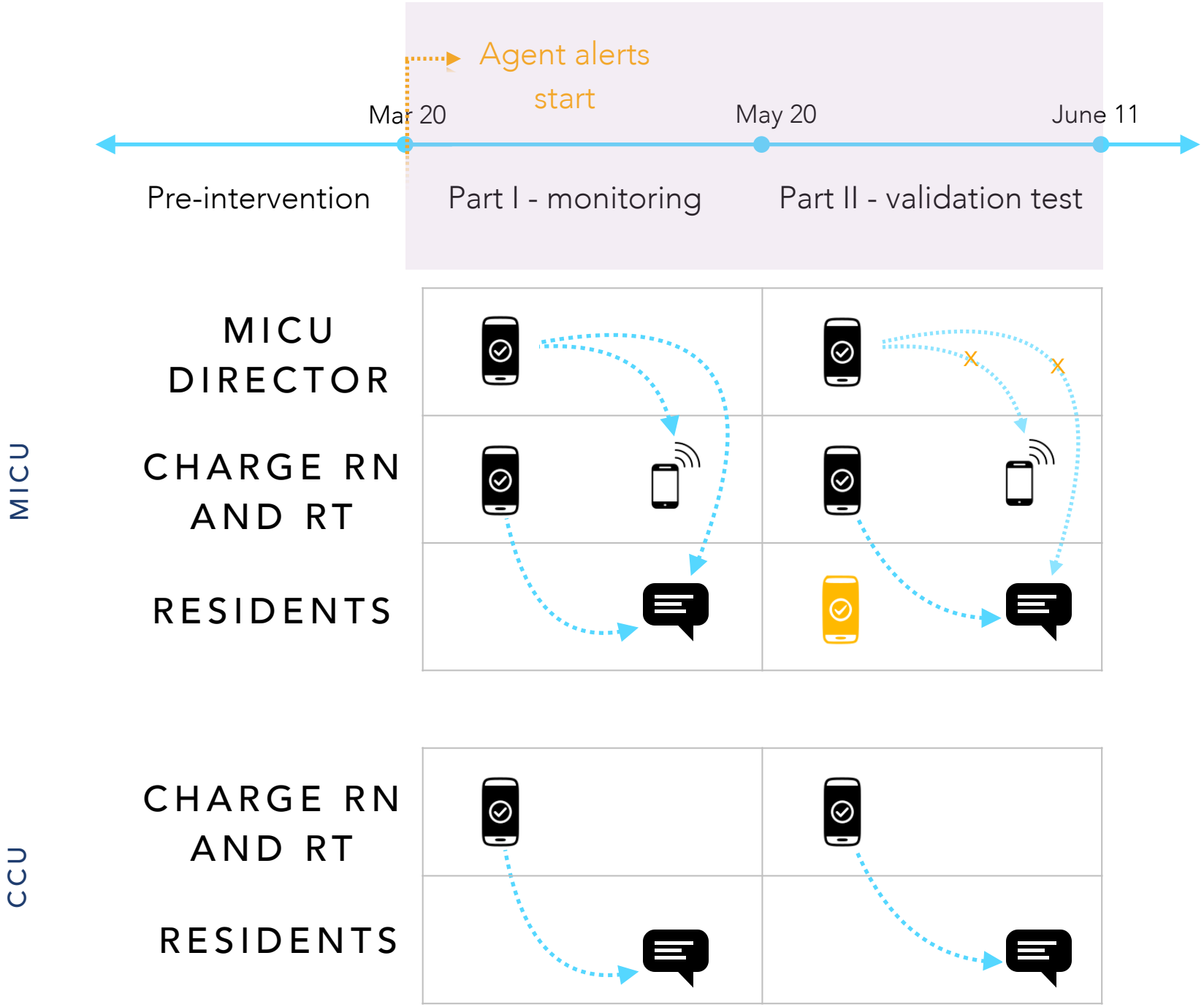
After:
40 intubations
37 order sets





Overall since the intervention, there has been a 30% + high risk screen for extubation

~9 high risk patients would have been caught with the alert in the 30 days prior to the intervention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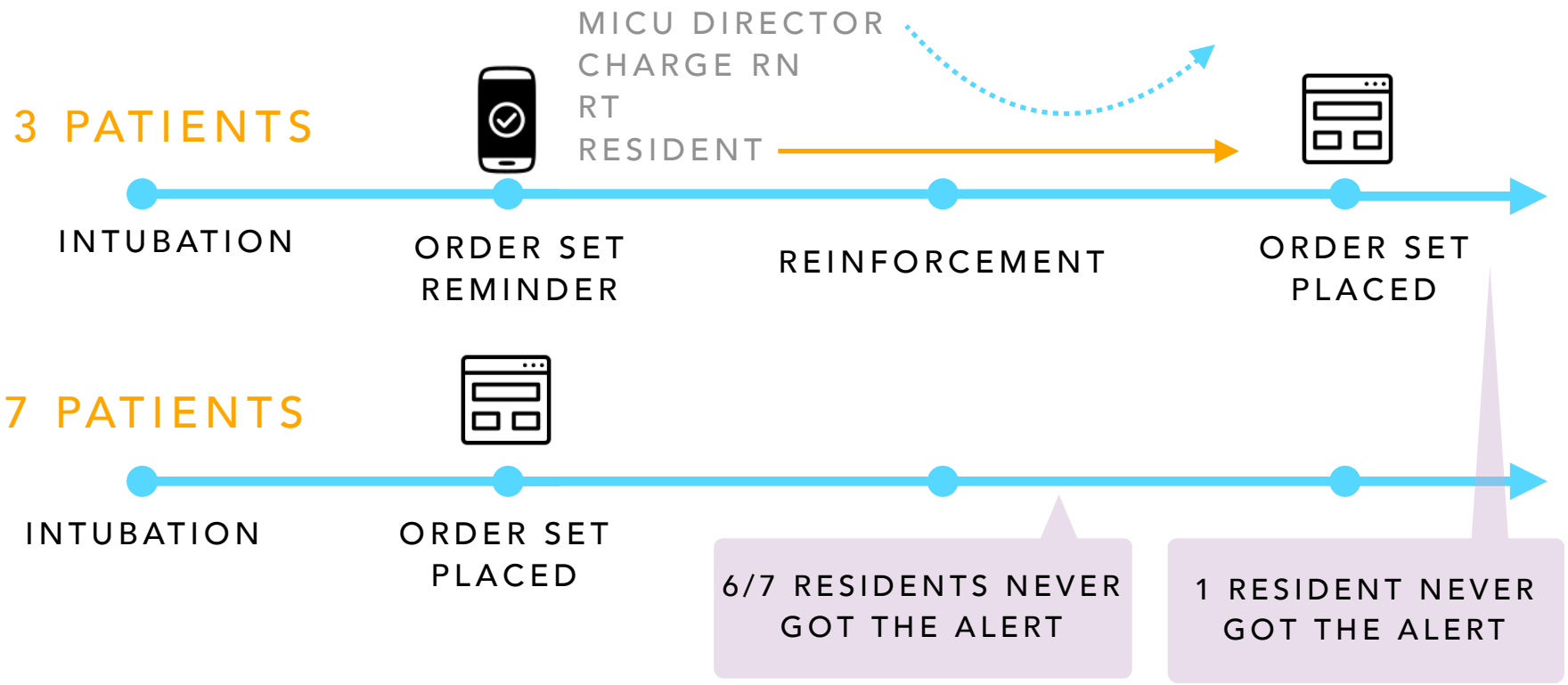
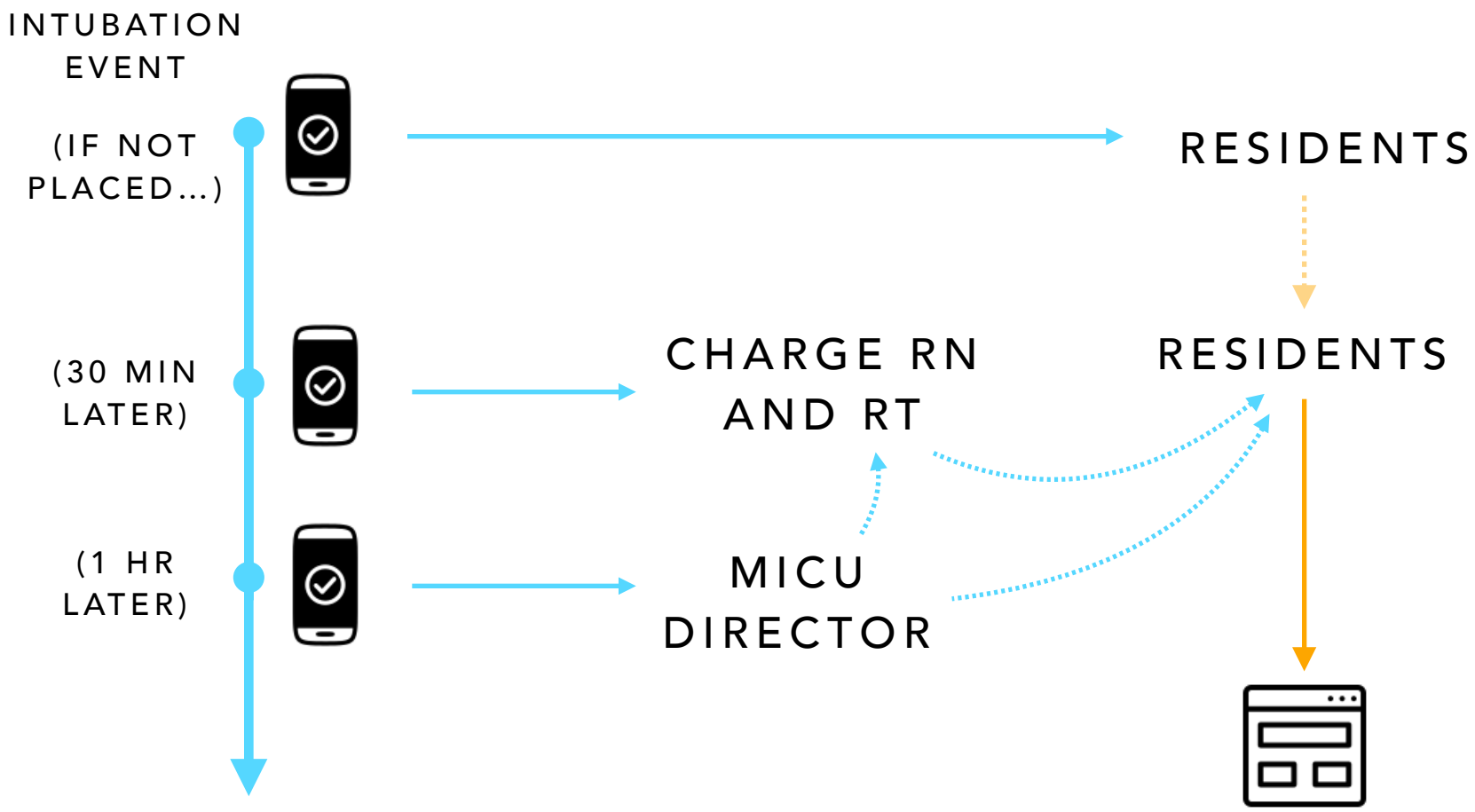


Alerts to Residents were not key to adherence

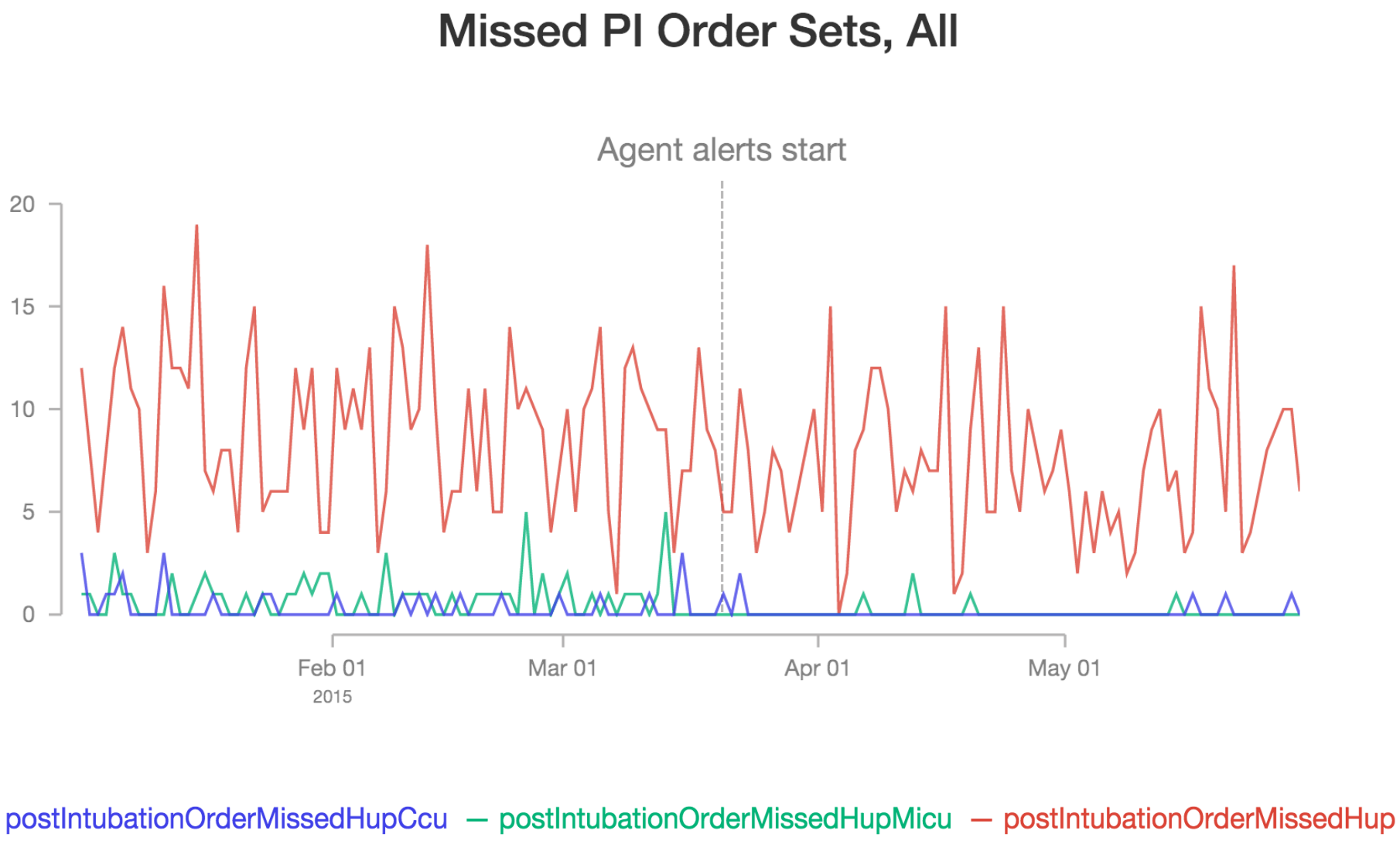
The behavior change is predominantly due to verbal reminders and reinforcement from Respiratory Therapy at the time of intubation

Reinforcement has perpetuated a culture & awareness

Adapted model for Escalation of Reinforcement:



Opportunity for scale (all HUP)



NEW STAT MEDS & INFUSIONS NOTIFICATIONS TO IMPROVE NURSING TASK EFFICIENCY

FOR F14 NURSES USING AGENT + CUREATR

Executive sponsors: Bill Hanson, Roy Rosin

Clinical Champion: Neha Patel, MD

Users: 5 RNs from Founders 14 Martin Services

Contacts:
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Supporting partners:
Shivan Mehta, MD
Michael Newcomb, RN BSN

Timeframe: 3/31/15 - 4/12/15

STUDY DESIGN

Goals:

1. Determine if there is improvement in med/order administration delay by receiving alerts from Agent.
2. See if timeliness/task efficiency is a use-case area for nursing use of Agent

Control:

Founders 12

Comparing before and after on both floors

Duration:

Two weeks

Feedback Methods:

With Testers:

- Via open Katherine<->Tester Cureatr thread for troubleshooting and live feedback
- Announce close of trial via Cureatr and email and local leader.
- Debrief upon conclusion of trial, and gather qualitative feedback via interview and anonymous survey.

With Local Leaders:

- Outline proposal charter together
- Train to be another go-to for troubleshooting
- Announce start and close of trial
- Debrief upon conclusion of trial, and gather qualitative feedback via interview and anonymous survey

With Stakeholders:

- Update at ~weekly, and upon conclusion of test trial period
- Provide summary of findings 1-2 wks following conclusion of trial

RESULTS

Stats:

of RN's : 5
# of alerts received: 72
# of shifts: 22
# of alerts / shift (avg): 3.3
# of false positives: 0
# of false negatives: 1

Other alerts some chose to opt in for:

- New diet notification
- EWS 1.0
- Critical lab results
- Covering provider change
- Location notification

Lessons learned:

Alert fatigue was not an issue.

- No requests to opt-out of an alert, even when offered.
- All 5 wanted to keep alerts past the close of the validation test.
- Even with <10min delay, very few alerts seen first through Agent
- May have been a selection bias with 5 conscientious nurses
- RN's learned about data from own routine EMR check or talking to MD

Received requests for multiple new recipe ideas:

- Alert when tele order is d/c'd
- integration with sunrise — if Agent can alert when flag has NOT been cleared
- Abnormal vitals (temp > 101, hr, etc). Might be up to an hour before vitals are checked. 7-8am, 11-noon, 4:30-5:30pm.
- Abnormal blood sugars < 150 and < 80. (checked by CNA's. there is lag time or inconsistent verbal communication or documentation in sunrise. CNA's don't have cureatr).

DISCUSSION

User stories and feedback:

Nice to have:

"It's good. I hope it stays."
- Colleen Regan

"I get to keep these alerts? Good."
- Christina Furia

"Swiss Cheese" Utility:

Even though they hadn't learned about the stat order from Agent first,

"I would rather have it, as a reminder. I would rather have it than not." - Jessica Persicketti

"They're still really helpful, for those times when I'm stuck in a room and won't be able to check sunrise."
- Christina Furia

"Yes, I use them as reminders. When I get another message from someone, I can look back at the thread and remember that the order happened." - Amy Mergott

Other Alert Success:

NPO diet notification:

"I did use it as a reminder to tell the patient."

Do you think that it is a good change? What would have happened otherwise?

"Probably because I was just walking in the nurse's station right near his room so I was able to go right in."
- Jessica Persicketti