

# The Synergy to Reduce Codes: Structures Crumble without a Foundation

Paulsen RA & Mann, KJ

## Introduction

Code Blue events in pediatrics are most commonly the result of respiratory arrest or circulatory collapse. The events are rarely sudden and are often accompanied by a period of clinical deterioration/escalation. The ability to impact the course of illness during this pre-arrest phase has been the impetus for several important advancements in the delivery of healthcare to children, including Rapid Response Teams (RRT) and Pediatric Early Warning Scores (PEWS). In addition, The Institute for Healthcare Improvement, The Joint Commission, and the Agency for Healthcare Research and Quality have all made this a focus at some level. What is recognized, however, is that RRT and PEWS are just tools that must be operationalized within a complex system. That system must have a foundation where safety is a priority, change is embraced, open communication is expected, and multi-professional teamwork is the norm in order to translate those tools into truly safe practices.

Children's Mercy Hospital has focused on eliminating code blue events outside the intensive care units (ICU) by taking a comprehensive approach that includes engaging leadership (Board level goal), promoting a culture of safety (Nurse & Resident Council, Culture of Safety Survey), and adopting specific best practices (RRT, PEWS).

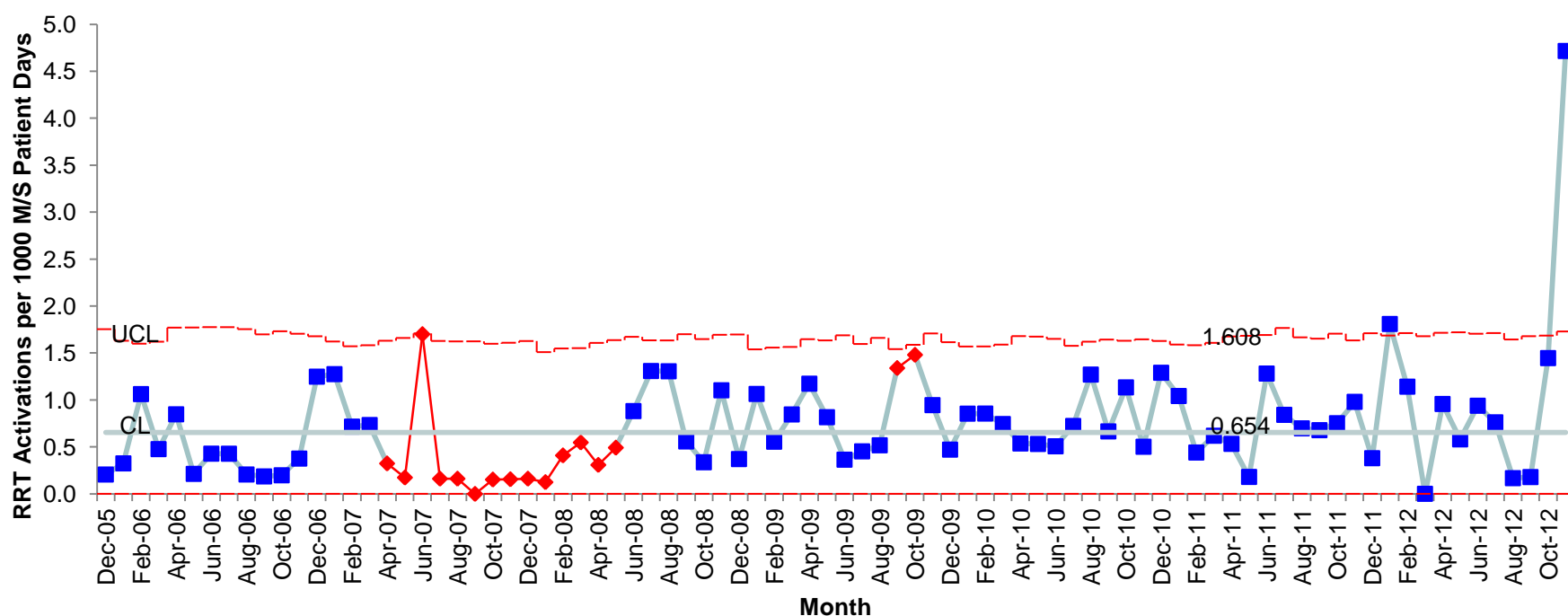
## Methods

**Setting:** Children's Mercy Hospitals and Clinics (CMHC), located in Kansas City, Mo., is a 362-bed hospital system that provides care for children from birth through transition to adult care. Over 600 physicians, representing over 30 specialties, make up the medical staff, the majority of whom are employed by CMHC. CMHC employs about 2300 nurses. There were 13,396 total inpatient admissions accounting for 76,827 patient days in FY12. The medical-surgical (med-surg) floors accounted for 11,174 admissions and 48,618 patient days.

**Planning the intervention:** Interventions aimed at impacting code blue events are coordinated between the resuscitation committee and the quality improvement department. Interventions are now chosen based on root cause analysis of code blue events and expert opinions of those on the resuscitation committee and quality department focusing on this effort. Discussion is held at least quarterly in the Quality Improvement Steering Committee and Medical Executive Committee.

**Operational definitions:** Number of code blue events outside ICU is measured as the number of actual patient events (not activations) per 1000 med-surg patient days (defined as patient days + # of observation patients). CHA Whole System Measure inclusion and exclusion criteria are used.

RRT Activations per 1000 M/S Patient Days



Pediatric Early Warning Score (PEWS)

	3	2	1	0
<b>BEHAVIOR</b>	<ul style="list-style-type: none"> <li>Lethargic</li> <li>Confused</li> <li>Reduced pain response</li> </ul>	<ul style="list-style-type: none"> <li>Irritable</li> <li>Inconsolable</li> </ul>	<ul style="list-style-type: none"> <li>Sleeping</li> <li>Consolable when fussy</li> </ul>	<ul style="list-style-type: none"> <li>Playing</li> <li>Appropriate</li> </ul>
<b>CARDIOVASCULAR</b>	<ul style="list-style-type: none"> <li>Cyanotic</li> <li>Mottled</li> <li>Cap refill 5 seconds or longer</li> <li>HR 30 bpm above norm for age</li> <li>HR less than 60 bpm</li> </ul>	<ul style="list-style-type: none"> <li>Cyanotic undertones</li> <li>Cap refill 4 seconds</li> <li>HR 20 bpm above norm for age</li> </ul>	<ul style="list-style-type: none"> <li>Pale</li> <li>Cap refill 3 seconds</li> </ul>	<ul style="list-style-type: none"> <li>Color normal for ethnicity</li> <li>Cap refill 1-2 seconds</li> <li>HR within norm for age</li> </ul>
<b>RESPIRATORY</b>	<ul style="list-style-type: none"> <li>RR below norm for age</li> <li>Rating</li> <li>Grunting</li> <li>Head bobbing</li> <li>FiO2 50% or higher</li> <li>O2 delivery 9 L/min or higher</li> </ul>	<ul style="list-style-type: none"> <li>RR 20 above norm for age</li> <li>Retracting</li> <li>FiO2 40% or higher</li> <li>O2 delivery 6 L/min or higher</li> <li>CPAP</li> </ul>	<ul style="list-style-type: none"> <li>RR 10 above norm for age</li> <li>Retracting</li> <li>FiO2 30% or higher</li> <li>O2 delivery 3 L/min or higher</li> </ul>	<ul style="list-style-type: none"> <li>RR within norm for age</li> </ul>
<b>SCORE 2 EXTRA FOR:</b>	<ul style="list-style-type: none"> <li>Every 15 minute or continuous nebulizer treatments</li> <li>Persistent postoperative vomiting</li> </ul>			

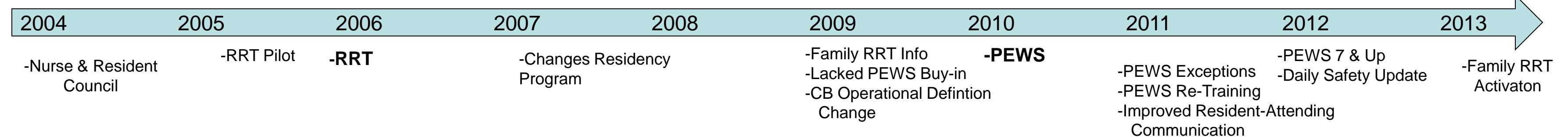
PEWS = 7 or greater	PEWS = 5 or greater	PEWS = Total score of 4, or 3 in one category	PEWS = 3	PEWS = 0-2
Re-assess with experienced nurse and request provider assess patient at bedside.	Re-assess with experienced nurse and request provider assess patient at bedside	Re-assess with experienced nurse and consult provider to determine next steps for care	Re-assess with experienced nurse and agree on nursing reassessment plan	Re-score with next routine vital signs
Nurse must call the attending physician to discuss assessment findings				
Re-score in 30 minutes	Re-score in 1 hour	Re-score in 2 hours	Re-score in 4 hours	

Age	28 Week GA	32 Week GA	34 Week GA	Term NB	1 Mo	3 Mo	6 Mo	1 Yr	2 Yrs	4 Yrs	6 Yrs	8 Yrs	10 Yrs	12 Yrs	14 Yrs	Adult
Heart Rate	120-180	120-180	120-180	90-170	110-180	110-180	110-180	80-180	80-130	80-120	75-115	70-110	70-110	60-110	60-105	60-100
Respiratory Rate	55-65	55-65	55-65	40-60	30-50	30-45	25-35	20-30	20-30	20-30	18-24	18-22	16-20	16-20	16-20	12-16

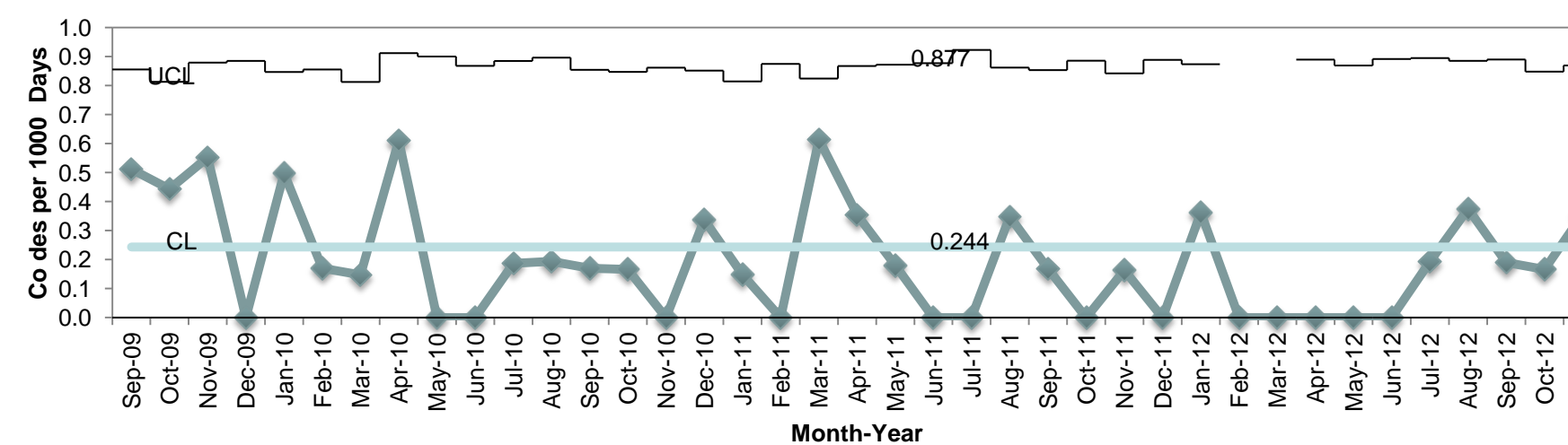
Mod 6/6/12

## Timeline



## Results

Full Inpatient Codes Outside the ICU per 1000 Med/Surg Patient Days



Desired Direction	FY2010	FY2011	2012 Target <sup>2</sup>	FY2012 (YTD)	1Q2012 (Jul11-Sep11)	2Q2012 (Oct11-Dec11)	3Q2012 (Jan12-Mar12)	4Q2012 (Apr12-Jun12)	Data Reflected Through
Response to Deteriorating Clinical Condition	56	58	N/A	48	12	12	21	3	04/30/12
RRT Activations Codes Outside the ICU <sup>1,2</sup>	0.27	0.20	0.18	0.10	0.18	0.06	0.12	0.00	04/30/12

## Discussion

**Summary/Conclusions:** Code blue events occurring outside the ICU can be impacted with a sustained approach that includes engaged leadership, creating a culture of open communication, working on team development, and implementing specific tools to improve anticipation of and recognition of patient decline. Many confounding variables and the dynamic nature of the hospital environment make it hard to gauge the impact of each specific intervention; however, the overall impact of fostering a culture of safety while implementing tools to decrease codes outside the ICU led to sustained decreases in the number of code blue events.

The need for thoughtful implementation of changes, engaging front line staff, and partnering with families is critical to success. The first attempt at implementing a complex new tool into a dynamic system is always difficult, but because the hospital viewed this as an important initiative, the foundation of support was there to adapt to the changes and learn from failures.

**Limitations:** There are limitations to this work. Personnel and policy changes on the med-surg floors impact the structure of the teams caring for the patients. Other improvement initiatives, such as those displayed on the timeline (center of poster), directly and indirectly impact outcomes. Isolating the effect of each is nearly impossible; thus, it is difficult to determine the exact impact of a specific initiative on the overall measure of code blue events.

