



Impact of Rapid Response Team Education on Ward Code Blues

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INTRODUCTION

In-hospital adverse events are estimated to affect up to 17% of hospitalized patients and to cause up to 98,000 patient deaths per year in the United States. Unexpected codes in hospitalized patients are one of the most significant adverse events, carrying a risk of death that is reported to range from 50% to 80%¹. PIH Health Hospital Downey (PHH-D) has nearly double the rate of cardiopulmonary arrests compared to that of surrounding hospitals. Therefore, PHH-D implemented a Rapid Response Team (RRT) protocol in 2017. The RRT is a multidisciplinary team comprising of a critical care nurse, who has been specifically trained in the RRT protocol, as well as a respiratory therapist. The RRT immediately responds once a floor nurse activates a rapid response with the goal of triaging patients: recognizing and activating immediate interventions vs. immediate transitioning to the ICU before the patient has a Code Blue on the floor.

The objective of this study is to assess the effect of RRT protocol education on Ward Code Blues, i.e. the number of Code Blues in admitted patients outside of the ICU. To do this, Code Blue events over 2018 and 2019 fiscal years were analyzed. Each code was reviewed to evaluate if the patient met at least 1 of the 14 RRT criteria in the 24 hours leading up to the event, which would have prompted an earlier assessment by the RRT with possible transitioning to the ICU before the event occurred. Frequently missed RRT criteria in 2018 became additional educational points for the nursing staff training in 2019.

METHODOLOGY

In order to determine the impact of RRT on Code Blues at PHH-D, an ongoing prospective cohort study was implemented. PIH Downey is a non-profit hospital that serves the LA county region with its 199-bed facility.

All non-ICU cardiopulmonary arrests from October 2017 - June 2019 were reviewed. The cases were separated into two groups based on PHH-D's fiscal year, which runs from October to September, i.e. October 2017 - September 2018 and October 2018 - June 2019 (currently ongoing as we are in the 2019 fiscal year). Each Code Blue and Rapid Response called throughout the hospital was recorded, including a description of the event and where the event occurred. Each case was evaluated 24 hours prior to the activation of Code Blue to determine if the patient met any RRT criteria. The RRT criteria is listed in Table 3.

The data for 2018 were analyzed to ascertain the rate of Code Blues in the hospital and the most commonly missed RRT criteria. The missed criteria were further emphasized during RRT protocol training for the floor nursing staff prior to October 2018. The data for 2019 are similarly being analyzed for further training purposes. The data from both years were compared with the chi-square test. ICU Code Blues were recognized and omitted from analysis.

DATA

	2018	2019
Total Code Blues	83	81
ICU Code Blues	58	51
non-ICU Code Blues	25	30
Code Blues that met RRT criteria in the preceding 24 hours	22	22
Ward Code Blues per Bed Days	8.8%	12.6%
Ward Code Blues per 1000 admissions	3.0%	4.4%

Table 1. Number of true Code Blues that occurred in the sample population

Rapid Response Criteria	2018	2019
Primary nurse having clinical concern of patient deteriorating	3	4
Positive sepsis screen	3	1
Acute change in HR <50 or >130	8	6
SBP <90 or >200 or DBP >110 with new symptoms	7	4
Change in respiratory rate <8 or >30	5	1
Acute change in pulse oximetry <90% despite O2 or progressive increase in O2 requirements	12	10
Acute change in urine output to <50 mL in 4 hours without history of renal dysfunction	2	0
Acute change in level of consciousness	6	4
Signs and symptoms of a stroke	0	1
New, repeated, or prolonged seizures	0	2
Uncontrolled bleeding or large acute blood loss	3	1
Uncontrolled pain	3	4
Unexplained agitation for >10 minutes	0	2
Patient is in distress and the physician is not responding within 10 minutes	1	1

Table 2. Number of instances which patients met criterion for Rapid Response which was not called in the 24 hours leading up to the Code Blue.

RESULTS

In 2018, total Ward Code Blues per 1000 admissions was 3.0%. There were a total of 390 Rapid Responses in which 25 became Code Blues and of those, 22 met RRT criteria. It was found that the top three commonly missed RRT criteria were acute changes in pulse oximetry <90% despite O2 supplementation, blood pressure changes, and acute change in HR. These were reinforced in the RRT protocol training education for floor nursing staff prior to the 2019 fiscal year.

As of June 2019, total Ward Code Blues per 1000 admissions was 4.4%. There has been a total of 316 Rapid Response in which 30 became Code Blues and of those, 22 met RRT criteria. The most commonly missed RRT criterion so far is still acute change in pulse oximetry <90% despite O2 supplementation or progressive increase in O2 requirements.

Comparing the proportions of Code Blues meeting RRT criteria against non-ICU Code Blues between the 2 years, 2018 showed 88.0% of Code Blues meeting RRT criteria while 2019 was 73.3%. The chi-square test = 1.8, with a difference of 14.7% with p=0.18.

CONCLUSION

PHH-D data analysis between the two fiscal years reveals that despite addressing missed criteria in RRT education, there is an increase in the percentage of Code Blues. The data from this small sample size are non-significant, indicating that there is not much difference between the two years. Of note, the percentage of Code Blues meeting RRT criteria declined by 14.7% indicating that there were more cardiac arrests with fewer patients meeting RRT criteria prior to the event. Since 2017 to 2019, there has been an increase in number of Rapid Responses called from 18 RRT/mo to 35 RRT/mo, which led to appropriate immediate patient interventions. From 2018 to 2019, rates show that there is a 0.64% increase in the number of RRT called that prompted transfer to the ICU as well as a 2.35% increase in the number of patients who were appropriately intervened to prevent physiological decline.

FURTHER INVESTIGATION

Our team encountered several questions in our analysis of the impact of RRT protocol on Code Blues at PHH-D.

The biggest question was why there was an increase in Code Blues despite increased RRT education on Rapid Response protocol. One possibility could be the influx of new nurses with frequent turnover at PHH-D over the past two years. PHH-D is one of the main hospitals that accept nursing graduates with no prior experience, which can impact the inability to recognize early signs of patient clinical decompensation. Another explanation can also be in the changing demographics of the Downey community since PIH recently has taken over a previously community hospital and is currently transitioning into a stroke center.

With the decrease in the number of Code Blues meeting RRT criteria, there is a possibility that the RRT criteria were entirely missed or the patient did not show any signs/symptoms. Given these results, this year PHH-D has implemented a high-risk simulation with emphasis on the top three missed RRT criteria to train the floor nursing staff. This will help to increase awareness and recognition of patient's acute physiological decline, leading to timely RRT calls for immediate interventions preventing the progression to Code Blues on the floor. Furthermore, there were situations where RRTs rapidly progressed to Code Blues in a matter of minutes, which begs the question as to whether or not there would have been a difference in patient outcomes if a Code Blue had been initially called instead of a RRT.

One of the limitations of our study was that our review was dependent on chart records. In other words, our analysis was limited to what was documented in the EMR. At this time, we will continue to emphasize the importance of accurate documentation to all healthcare providers.

This is an ongoing Quality Improvement Project being followed by residents of PIH Health Family Medicine Residency Program under the supervision of Critical Care/Pulmonology specialist Dr. Yasmeeen Shaw. It is to be noted that the data available in this study only included a portion of the 2019 fiscal year in comparison to that of the entire 2018 fiscal year. We will continue to analyze the present data and incorporate the data from the remainder of the fiscal year.

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