Fall 12-17-2021

Program Evaluation of the Rapid Response System Prior to and During a COVID Surge

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Abstract

Between the years 2004-2008, the Institute for Healthcare Improvement (IHI) and The Joint Commission made a recommendation for healthcare facilities nationwide to implement rapid response systems (RRS). Rapid response systems consist of four limbs: recognition and alert (afferent); response and providing timely patient management (efferent); delivering support and oversight (administrative), and monitoring the RRS patient outcome data (quality improvement). The intent of implementing RRS was to increase patient safety and outcomes within the acute care setting. The following question (PICO) formed the basis of the project: "How does the current rapid response system workflow compare to the rapid response system pre-COVID-19 pandemic in terms of lower mortality rates, non-ICU code blues, and workflow?" A program evaluation was conducted to assess the rapid response system at a large Catholic, academic, Level 1 trauma health system (547 beds), using the W.K. Kellogg *Step-by-Step Guide to Program Evaluation*. The evaluation revealed that this medical facility's RRS had not been reviewed since early 2015 (concluding in December 2017). A few years after this formal review, the COVID-19 pandemic struck in early 2020. To conduct a current evaluation, descriptive statistics were utilized to summarize the outcome data and retrospective quantitative data was obtained from the hospital's quality and analytics department for FY2019-FY2021 (two fiscal years). The goal of this evaluation was to determine how or if the RRS had been affected during the 2020 COVID-19 surge. This program evaluation of the rapid response system is key to understanding why frequent assessments of these critical programs are vital to reduce patient mortality and maintain RRS workflow.

Keywords: rapid response system, rapid response team, acute care

Program Evaluation of the Rapid Response System Prior to and During a COVID Surge

Rapid response systems (RRS) are a coordinated and system-wide approach to respond to patients in crisis (Stolldorf et al., 2020). These systems encompass a 24/7 team of highly skilled clinical staff that can provide care and resources at the bedside of a declining patient outside of the intensive care unit (ICU). Depending on the healthcare organization, this group is known as a rapid response team (RRT), critical care outreach, or a medical emergency team (MET). The overall intent of such teams and systems is to prevent adverse outcomes, such as cardiac arrest (code blue), related to the deteriorating status of patients. Such systems have become an essential piece to improving patient outcomes within healthcare organizations.

Background and Significance

Between the years 2004-2008, the Institute for Healthcare Improvement (IHI) and The Joint Commission made a recommendation for healthcare facilities nationwide to implement rapid response systems. Such implementation was intended to increase patient safety and outcomes within acute care settings. Rapid response systems have shown benefits in decreasing in-house, non-ICU cardiac arrests, length of stay, mortality and morbidity rates, and increase in staff satisfaction (Lyons et al., 2018).

A program evaluation of the RRS was conducted at a large Catholic, academic, Level 1 trauma health system with 547 beds, based in Illinois' western suburbs. At this facility, the RRS includes an ICU nurse and respiratory therapist as the RRT. Historically, the primary team was staffed by the medical ICU and a backup team from the burn ICU. There had been administrative support from a nurse manager and assistant director, in addition to data being tracked by the quality department. At the start of this program evaluation, the RRT nurse manager recognized that the RRS and RRT had not been evaluated since 2015 (concluding in late 2017) to determine

its effectiveness. During a surge of COVID-19 in 2020 (November), changes occurred in the workflow of the RRS. The medical ICU was challenged with staffing the RRT, the hospital's COVID ICU, and its unit. At that time, changes in the origin of the team occurred to help balance some of the workload of the medical ICU and to ensure a team was available to respond to non-ICU critical situations. An evaluation of the RRS assisted in identifying inconsistencies in the rapid response team during a surge in COVID-19 and provided recommendations to improve the quality of care and patient outcomes.

Literature Review

An electronic literature search was conducted utilizing CINAHL, Google Scholar, and PubMed. The search terms utilized were "rapid response system," "rapid response team," and "rapid response system and acute care." Each search was narrowed to the English language, academic full text, and the "adult" age range, with the time frame varying from 2002-2021. The search generated 37 relevant articles, 18 of which specifically addressed RRS, 10 that were specific to RRT, and nine that addressed hospital patient outcomes. The articles' level of evidence ranged from I to V with good-to-high quality. Four articles were excluded from the literature review due to low evidence content.

Summary of Previous Studies

Rapid response system is an overarching term that encompasses four components (limbs) to be effective in the management of critical patients. The literature defines the first element of an RRS as a recognition and alert limb (afferent), which is often a medical-surgical nurse noting signs and symptoms of a patient declining (Al-Qahtani & Al-Dorzi 2010; Olson et al., 2019; Sakai & DeVita 2009; Sebat et al., 2017; Stolldorf & Jones 2015; TeamSTEPPS 2019; Winters et al., 2013; and Wood et al., 2009). Symptoms may include a change in vital signs or level of

consciousness. When such assessments are noted, the nurse activates an immediate summons (or call) for assistance. The second limb (the efferent limb or RRT) is responsible for responding to this urgent call and providing timely patient management. Depending on the facility, resources available, and type of hospital (teaching vs. non-teaching), the composition of the RRT may vary. Some facilities may have a nurse-driven team, though others have a physician-driven team or dedicated RRT nurse. In addition to the afferent and efferent limbs, an RRS has a limb (administrative) that delivers support and oversight on the process, while also providing evaluation, feedback, and governance (Stolldorf & Jones, 2015). Lastly, to ensure that quality indicators are being met, another limb (quality improvement) monitors the RRS patient outcome data.

Understanding how the four limbs function together is imperative for nurses and physicians. The RRS aims to improve the timely recognition and treatment of non-ICU patients that are exhibiting signs and symptoms of deterioration (Aitken et al., 2014; Simmes et al., 2013). Given the aging population, patients are more likely to be ill and admitted to medical-surgical units with higher acuity (patients that are critical requiring additional care). This high acuity places patients at increased risk for a decline in status. RRS provides highly trained (usually ICU trained) professionals, resources, and clinical support to respond and deliver care before an adverse event, such as cardiac arrest, occurs. Typically, medical-surgical nurses (at the bedside) are the ones that recognize signs and symptoms of decline, prompting early intervention. Research has affirmed that rapid response systems have encouraged nurses and medical staff to identify declining patients more quickly (Bunch et al., 2019; Heal et al., 2017; Lyons et al., 2018; and Rihari-Thomos et al., 2019). The chance of patients' survival increases with quick, efficient, and timely responses.

The RRT is a multidisciplinary portion of the RRS that responds promptly and provides urgent patient care. The optimal composition of a team depends on the needs and resources of a particular facility. Leach & Mayo (2013) and Dukes et al., (2019) share that having a consistent, dedicated team allows for an enhanced, collaborative experience and permits this group, and the bedside nurse, to build a relationship. To have a successful RRT, members of this group should be provided education and training together (Simmonds, 2005). This training delineates roles and responsibilities, team communication parameters, rapid response criteria, and documentation requirements.

Criteria such as changes in vital signs, a change in the level of consciousness, shortness of breath, and/or a sepsis alert are indicators that a rapid response is needed. Each healthcare facility should determine what criteria are necessary for a nurse to initiate a rapid response. These criteria, in many cases, include physiological signs the patient is exhibiting that warrant additional assistance (Leach & Mayo, 2013; Simmonds, 2005). In clinically unstable patients, early detection and intervention by an RRT significantly reduce mortality from in-hospital, non-ICU cardiac arrest (Buist et al., 2002; Rothschild et al., 2008; Winters et al., 2007). The RRT helps determine the level of care necessary to meet the patients' physiological needs, which often includes moving them to a higher level (of care). Patients that exhibit a decline in status and remain on the medical-surgical unit have been shown to have increased mortality (Chalwin et al., 2019).

To prevent adverse patient outcomes (or results), outcome measurement is essential. Outcome measurements such as non-ICU cardiac arrest and mortality rates are examples of those used to evaluate the benefit of RRS and RRT. Winters et al., (2007) discuss that many observational studies have shown that RRS and RRT provide strong benefits to numerous

healthcare facilities by decreasing cardiac arrest and mortality rates. However, there is still controversy regarding the benefit of RRS in acute care facilities due to limited randomized trials. Outcome measurement with Level I evidence evaluating RRS and RRT has also been difficult to obtain due to varying constructs across health systems (Mitchell et al., 2019; Teuma Custo & Trapani, 2020). Such measurement is important to provide facilities with an idea of how their patient care compares to national benchmarks. Quality patient care is essential and outcome measurement is one mechanism healthcare facilities use to assist in ensuring that it exists. The outcome measures are vital to accurately assess what needs to be improved in inpatient care.

Therefore, when assessing the effectiveness RRS can have, administrators at facilities look to non-ICU cardiac arrest numbers, versus the number of RRT calls and mortality index, as key indicators. Research supports that the implementation of RRS in the adult acute care setting has been associated with an overall reduction in cardiac arrest and hospital mortality. Hence, a decrease in code blue numbers (cardiac arrest) is correlated with a decline in mortality and an increase in RRT calls and responses, indicating early detection and rescue (Chen et al., 2016 & 2014; Kollef et al., 2017; Maharaj et al., 2015; Santamaria et al., 2010; and Teuma Custo & Trapani 2020).

At the Catholic academic healthcare facility in Illinois, it was discovered that its rapid responses program had not been formally reevaluated after an official evaluation that took place between August 2015-December 2017 despite changes to the RRS and RRT. The purpose of this program evaluation was to evaluate the hospital's rapid response system, especially during times of surge in rapid response calls and patient outcomes prior to and during a COVID pandemic surge (starting April 2020). If the RRT responses are directly tied to preventing more serious

(patient) outcomes as evidenced by the literature review, the next logical step was reevaluating this hospital's processes.

The *Johns Hopkins Evidence-Based Practice (JHNEBP) for Nurses and Healthcare Professional Model* (Dang, 2022) was used to guide the overall evidence-based practice (EBP) project of the RRS program evaluation. The model is intended to be used with an interprofessional team to obtain diverse perspectives on the question at hand. Once the evidence and various perspectives were gathered, the information was then used to make improvements in patient outcomes. The question, "How does the current rapid response system workflow compare to the rapid response system pre-COVID pandemic in terms of lower mortality rates, non-ICU code blues, and workflow?" was developed to address the effectiveness of the RRS program.

Logic Model as Evaluation Framework

The hospital RRS was evaluated utilizing the W. K. Kellogg Foundation *Evaluation Guide and Logic Model* for program evaluations (2017). This guide provides a step-by-step approach to evaluation that identifies all aspects of a program. A logic model (see Table 1.1) was created to assist in the evaluation of the hospital's program and to provide a systematic visual of the major components of the logic model. These components were identified as inputs (resources), outputs (activities and audience), short-term, intermediate, and long-term outcomes of the program.

Description of the Project

Aims and Objectives

After collaborating with the interim chief nursing officer (CNO) and RRT manager, four project aims were developed. The first aim was to evaluate the rapid response system prior to and during the COVID-19 pandemic to identify the workflow and outcomes. The objectives were: to

complete an outcome evaluation of the rapid response system prior to and during the COVID-19 pandemic focused on workflow and patient outcomes using a systems-oriented approach and quantitative methodology; to evaluate if there was a regularly assigned team (by reviewing the hospital RRT schedule); to assess if there was administrative support for the RRS (by interviewing the hospital CNO), and to identify the impact of COVID-19 on the rapid response workflow from fiscal year July 2020-June 2021 by reviewing the RRT call rate and narrator report. The second aim was assessing rapid response patient outcomes prior to and during the COVID-19 pandemic. These objectives were: analyze the hospital's mortality index and examine the number of non-ICU code blue calls from FY2019-FY2021.

The final aim involved developing recommendations for improvement in the rapid response team workflow. The aim's objective was to provide an executive summary that includes strengths and weaknesses, as well as recommendations for workflow improvement that will focus on patient outcomes.

Methods

Data Management Plan

For this program evaluation, descriptive statistics were utilized to summarize the outcome data. Retrospective data were obtained from the hospital's quality and analytics department for FY2019-FY2021 (two fiscal years). This data was used for comparison to the former evaluation data reported in December 2017, when the evaluation officially concluded.

The data collection began with an evaluation of the facility's RRT policy as it related to the evidence. A complete review of historical background and data regarding the RRS and RRT responsibilities and outcomes was conducted. Historical background was obtained from correspondence with the ICU clinical nurse specialist and documents created when the RRS

was first initiated in 2007. The former evaluation project charter of 2015 was also reviewed. Finally, data were collected that included the RRT narrator report, rate of non-ICU RRT calls, mortality index, and the number of non-ICU code blues to measure the workflow and patient outcomes. This data was obtained from the quality and analytics department.

Types of Data

Narrator Report

The narrator report includes documentation of rapid response occurrences which is found in the hospital's electronic health record. It displays the time the call was initiated, the duration of the situation in minutes, where the situation occurred, the reason for the call, and the outcome of the rapid response (if the patient was transferred to the ICU, experienced cardiac arrest, or remained in their home unit). This report was utilized to evaluate the RRT's workflow by calculating the rapid's average length of time and the mean number of patients that were transferred to the ICU.

Rate of Non-ICU RRT Calls

The RRT call data provided an accurate measure of calls made by nurses requesting an RRT and indicated how often the RRT was utilized over a given time per 1,000 patient days. The RRT call rate is calculated by the total number of rapid response calls divided by the number of patient bed days. The result is multiplied by 1,000 to obtain the rate-per-1,000 patient days. By calculating per-1,000 patient days, the hospital can consider low-and-high census days occupied by patients, therefore capturing a more accurate composite RRT call rate (Agency for Healthcare Research & Quality, 2013). An increase in the rate indicates higher utilization of the RRT. This rate was tracked to evaluate the trend in calls for RRT workflow purposes.

Mortality Index

The next outcome measured was the mortality index, which is a measurement that assists in identifying death risk. The index value is calculated by dividing the number of observed deaths by the number of expected ones. The mortality index assists in measuring the quality of care at a hospital—data that can be compared over time. An optimal mortality index for this hospital was below 1 and was used as a comparison to other healthcare organizations for benchmarking.

Non-ICU Code Blues

The last outcome was the number of non-ICU code blue calls. A code blue call refers to an emergency call that is activated when a patient is found pulseless and needs immediate attention via cardiopulmonary resuscitation (CPR). When a patient requires life-saving measures via CPR, the risk for mortality increases. The raw number of code blue calls was used for this program evaluation and extracted from the hospital's electronic medical record.

Findings

In 2016, the primary RRT was staffed by the medical ICU and a backup team from the burn ICU. In April 2020 (the last quarter of FY2019-2020), during the initial surge of COVID-19, the medical ICU was staffing, taking charge, and training nurses in the COVID ICU, in addition to maintaining the medical ICU and RRT. In November 2020 (second quarter FY2020-2021), during the second surge of COVID-19, the RRT shifted from originating in the medical ICU to rotating originations among the various ICUs on a weekly basis. The new rotation of RRT origination was implemented to help balance some of the workload of the medical ICU and ensure a team was available to respond to non-ICU critical situations. RRT team rotations did relieve the medical ICU of some of its staffing challenges; however, there was no longer a specific team that the medical-surgical nurses were familiar with. In addition, during this evaluation, it was

identified that there was no formalized rapid response process for another COVID-19 surge or pandemic.

During the time of 2015-2018 administrative oversight support came from a nurse manager and assistant director. In 2019 administrative support was absent. In addition to a lack of administrative oversight, routine review of the RRT and the system evaluation was also absent. Additionally, the RRT quality data (RRT call rate, number of non-ICU code blues, and mortality index) had not been officially reviewed since late 2017.

To assess the impact of COVID-19 on the rapid response workflow (Table 1.2), the average length of time for a rapid response, and the percentage of patients that were transferred to the ICU, data from two fiscal years (2019-2020, 2020-2021) FY2019-FY2021, were evaluated. The duration of time for a rapid response before COVID-19 (FY2018-2019) was an average of 25 minutes (Table 1.2). Comparatively, the average time for a rapid response was 28 minutes for FY2019-2020 and FY2020-2021. It is noted that there was a COVID-19 surge during the last quarter of FY2019-2020 through FY2020-2021. Before COVID-19 (FY2018-2019), the percentage of patients transferred to the ICU after a rapid response (Table1.3), was 30%. However, at the start of COVID-19 (fourth quarter FY2019-2020), the percentage of patients transferred to the ICU was 27% and 20% for FY2020-2021. Incomplete data on the narrator report made securing an accurate percentage of patients transferred to the ICU difficult.

In addition to evaluating the narrator report, the RRT call rate (Table 1.4) was also assessed. Prior to COVID-19 in FY2018-2019, the call rate was 15.88 per 1,000 patient days. At the end of the last evaluation, the goal had been met in December of 2017; therefore, the evaluation did not measure a full fiscal year. The RRT call rate indicates an increase in calls

compared to the call rate from December 2017, which was 13 per 1,000 patient days. During FY2019-2020 (this included the first COVID surge) the call rate was 13.04 per 1,000 patient days and 12.22 per 1,000 patient days for FY2020-2021 (second COVID surge), reflecting a decrease in rapid response activation.

Evaluating rapid response patient outcomes involved analyzing the mortality index and the number of non-ICU code blues (cardiac arrest). The hospital's mortality index (Table 1.5) from FY2019-FY2021 fluctuated slightly. Similarly, due to the goal attainment, the mortality index data was only released for December 2017; therefore, the evaluation did not measure a full fiscal year. In December 2017 the mortality index was 1.00. Before COVID-19 (FY2018-2019), the mortality index was 1.09. During the start of COVID-19, the mortality index increased to 1.12 for FY2019-2020 and then decreased during FY2020-2021 to 1.03. This hospital's mortality index is above 1.00, which is above the healthcare system's designated benchmark. Further evaluation of patient outcomes included the number of non-ICU code blue calls (Table 1.6). The data for non-ICU code blues was also reported only for December 2017. A comparison from 165 in December 2017 to 156 non-ICU code blues in FY2018-2019 revealed a decrease in the number of non-ICU code blue calls. However, at the beginning of COVID-19 (fourth quarter FY2019-2020), the number of non-ICU code blues decreased to 133 and then increased to 140 for FY2020-2021.

Discussion

To have a successful RRT, members of the team should be provided education and training. This training delineates roles and responsibilities, team communication parameters, rapid response criteria, and documentation requirements (Simmonds, 2005). There was no documentation of ICU nurses being trained as RRT nurses since 2006. The early part of the

pandemic was a time of much uncertainty and a decision to change the workflow was made under urgency. Additionally, there was no longer a consistent RRT origination nor a specific group of nurses responding to critical situations. Having a consistent, dedicated team allows for an enhanced and collaborative experience (Leach & Mayo, 2013; Dukes et al., 2019). At the start of COVID-19 (2019-2020), it is not evident that a plan was initiated on how the RRT would function or considerations of the challenges the medical ICU would face. Currently, there is little evidence on rapid response surge protocols during COVID-19. As this pandemic was a new phenomenon.

Administrative oversight of an RRS and RRT delivers support and management of the process, while also providing evaluation, feedback, and governance (Stolldorf & Jones, 2015). There had not been an official person in charge to ensure the RRT was running effectively since 2019. Due to the lack of administrative support for the RRT, evaluations of the RRT or RRS were not performed. Clear leadership and quality improvement provide the necessary foundation needed for an effective RRS (Olsen et al., 2019).

Rapid response time increased during COVID-19. This means the RRT was spending more time at a patient's bedside on the medical-surgical unit providing interventions, even though fewer patients were transferred to the ICU. During a time when there were more acutely ill patients admitted due to a respiratory-related virus, fewer patients being transferred was unexpected. Additionally, the RRT call rate decreased during a time of COVID-19, which was also unusual due to the incidence of a severe respiratory illness. Mitchell et al. (2021), commented that during COVID-19 reasons for activating a rapid response were in part due to respiratory distress in patients admitted. It is more beneficial that hospitals have a high rapid response call rate, as nurses are quickly identifying a decline in their patients' status and activating a call for assistance (Chen et al., 2016 & 2014; Kollef et al., 2017; Maharaj et al.,

2015; Santamaria et al., 2010; and Teuma Custo & Trapani 2020). As stated previously, it is critical to quickly identify a decline in status to achieve the best patient outcome possible (decrease in cardiac arrests).

The mortality index has increased at this hospital. This hospital's mortality index is above 1, which indicates more deaths. Ideal mortality would be 0, though this hospital strives to be below 1 for benchmarking purposes. Non-ICU code blue calls have increased in FY2021. An increase in the number of code blues indicates a decrease in RRT calls, thereby placing patients and the facility at a risk for increased mortality due to this lack of early intervention (Buist et al., 2002; Rothschild et al., 2008; Winters et al., 2007).

Recommendations

After completion of the program evaluation, recommendations were provided to the hospital regarding the RRS and RRT. The first recommendation was made to evaluate the effectiveness of the RRT frequently and after any change to the RRS, RRT, or protocol. The Kellogg (2017) *Step-by-Step Guide to Evaluation* recommends that facility managers develop an evaluation plan that is conducive to them. Collaboration with the quality department to evaluate RRT data monthly would help to ensure regular tracking of the data and allow for any necessary changes to be implemented (Stolldorf & Jones, 2015). Addressing missing data noted in this evaluation, a recommendation was made to ensure nurses complete documentation of the rapid response outcome. This recommendation included a best practice alert, built by the informatics team, which would assist in reminding nurses when there is incomplete RRT documentation. Further exploration into the decrease in RRT calls would evaluate the effectiveness of the current RRT. Medical-surgical nurses can feel uncertain when

to call a rapid response, uncertain of the type of response they would get from the RRT, and fear of someone questioning their judgment to activate a rapid response (Donaldson, 2009).

A second recommendation pertains to administrative oversight. Oversight is essential for the effectiveness, utilization, and quality data related to the RRS and RRT (Olsen et al., 2019). Depending on the ideal model for the hospital, administrative oversight may be a specific manager or someone with multiple units to manage and is dependent upon what works for the healthcare system. With new administrative oversight, the development of a proactive RRS consisting of a dedicated RRT nurse, nurse practitioner, or team could be initiated. The dedicated RRT members would not have a patient care assignment. Instead, they would round (making visits to) on high-risk patients, assess early warning signs (EWS) regularly (at least every four hours), and respond to emergencies (Burrell et al., 2020). This team would be visible to medical-surgical nurses as a resource and would help manage ICU staffing.

Conclusion

When evaluating a program such as the rapid response system, it is important to have an interdisciplinary team involved in support of the evaluation. This team should assist in the overall evaluation process. In addition to a team, stakeholders with buy-in are also essential. For this evaluation, the team consisted of the ICU clinical nurse specialist, the quality and analytics department, the department of professional practice, and the former RRT manager. In the program evaluation of the RRS discussed earlier, The *Johns Hopkins Evidence-Based Practice (JHNEBP) for Nurses and Healthcare Professional Model* (Dang, 2022) was used to guide the overall EBP project. The W. K. Kellogg Foundation *Evaluation Guide and Logic Model* (2017) was used for the evaluation of the RRS and RRT. Descriptive statistics were utilized to summarize the outcome data. Retrospective quantitative data was obtained from the

hospital's quality and analytics department for FY2019-FY2021 and used for comparison to the former evaluation data reported in December 2017. The comparison in data revealed that during the COVID-19 pandemic, changes were made in the workflow of the RRT.

Sustainability

The majority of the recommendations mentioned should not impose an additional cost on this hospital. The first recommendation entails collaboration with the quality department that currently exists at this facility, thereby presenting no additional costs. The second recommendation addresses incomplete documentation of the rapid response outcome through the use of a best practice alert built by the existing informatics team. This ultimately is raising the standard at the facility for RRT documentation. The third recommendation to further explore the decrease in RRT calls draws upon existing hospital resources such as bedside nurses. Finally, administrative oversight could be performed by an interim manager depending on the ideal model for the hospital.

The main cost of the program would be in developing a stand-alone RRT. The sustainability of this RRT is enhanced through the effective management of the team's design and implementation (Stolldorf 2020). The cost of staffing an RRT is estimated to be more than $1 million over five years at a medium-sized hospital (Dukes, 2019). This hospital can anticipate a little over $1 million (over 5 years) since it is a large facility. In comparison, the cost for in-hospital cardiac arrests is at an estimated $1 billion/year to the healthcare industry (Stolldorf, 2008). Therefore, initiatives aimed at decreasing the number of in-hospital cardiac arrests play an important role in decreasing the cost of health care. Such initiatives also decrease mortality and improve patient safety (Stolldorf, 2008). Given this information, the

integration of this program will benefit this hospital and be more financially sound in the long run.

Limitations

There were some limitations identified in conducting this evaluation. Documentation in the narrator report was not complete, therefore the workflow data collected may not reflect actual RRT outcomes. In addition, there is limited published research regarding the impact of COVID-19 and recommendations for RRS, RRT workflow, and the implementation of surge protocols. Therefore, there was no preexisting evidence to help guide this facility. Lastly, the evaluator did not have access to the hospital's budget to accurately determine the sustainability of a dedicated RRT.

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Table 1.1

Logic Model to Assist in Evaluation of RRS and RRT Pre-and During COVID-19 Surge

Project: Program Evaluation of the Rapid Response System Prior to and During a COVID Pandemic Surge					
INPUTS	**OUTPUTS**		**OUTCOMES**		
Resources	**Activities**	**Audience**	**Short-term Results**	**Intermediate Results**	**Long-term Results**
Staff nurses Rapid response team (RRT) Hospital administration RRT policy Dept. of professional practice Quality Department Physicians Electronic health record (EHR) Patients Informatics team (EPIC)	Provides a team Provides education to staff nurses during critical situations Provides assistance to staff nurses Provides care to patients in critical situations Algorithm	Staff nurses who need assistance Critical patients on medical units Physicians RRT Hospital administration Intensive care units	Rapid response system (RRS) will staff an RRT Staff nurses are educated on when to call the RRT Hospital staff are educated on how/when to call RRT RRS will have an identified RRT	The RRT will respond to critical situations Communication Patients of need will be transferred to ICU	Decrease in mortality/morbidity rates Decrease in non-ICU cardiac arrests Timely transfer of patients to ICU Increase in RRT calls

Table 1.2

Impact of COVID-19 on the Rapid Response Workflow: Response Pre- and During COVID

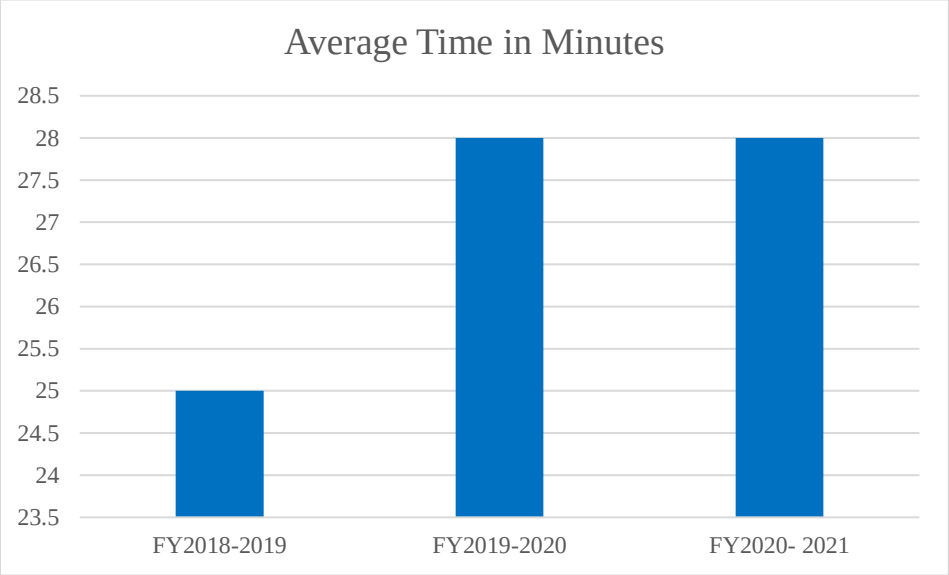

Table 1.3

Percentage of Patients Transferred to ICU Pre- and During COVID-19

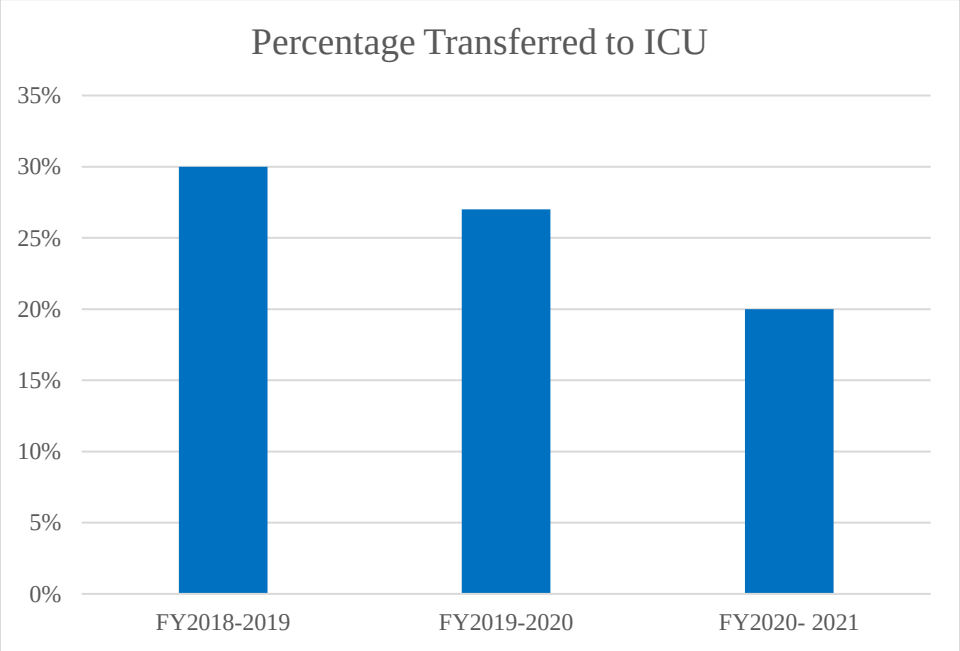

Table 1.4

Rapid Response Team Call Rate Pre- and During COVID-19 per 1,000 Patient Days

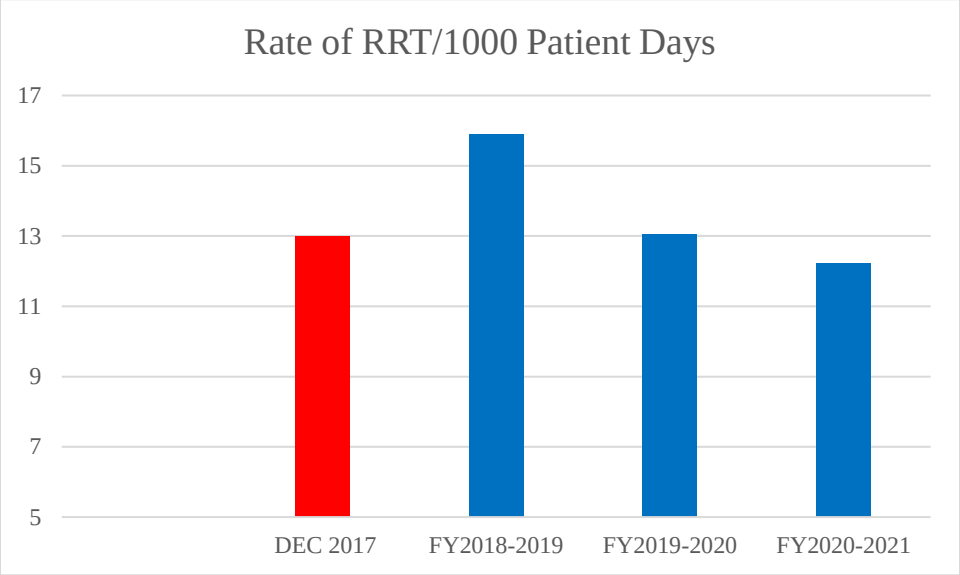

Table 1.5

Hospital Mortality Index Pre- and During COVID-19

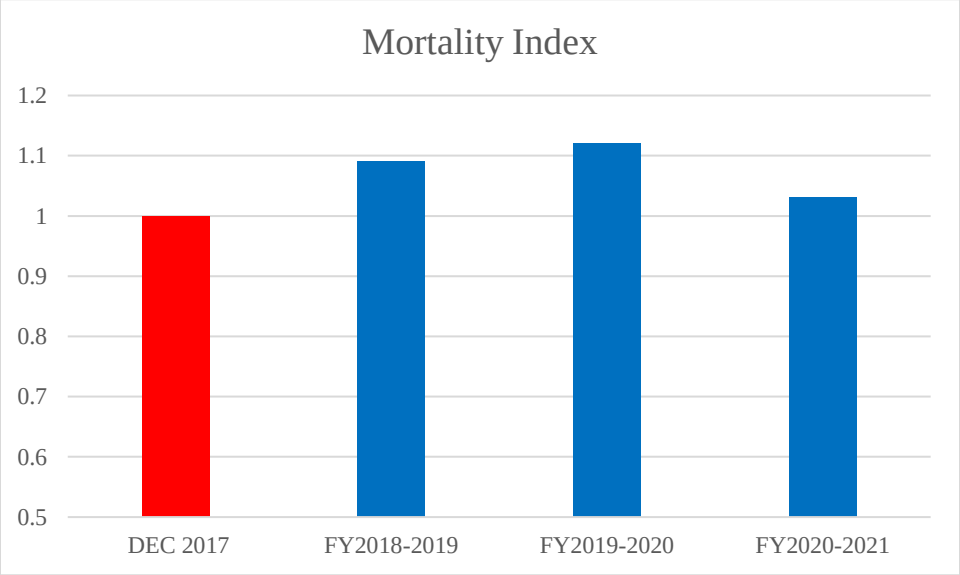

Table 1.6

Number of Non-ICU Code Blue Calls Pre- and During COVID-19