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Effectiveness of Implementation of MEWS with the help of RRS in Reducing in-Hospital Cardiac Arrest and Code Blue in a Selected Hospital Pune City

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Abstract

In-hospital cardiac arrest is preceded by the deterioration of a patient's physiological parameters and vital signs. Identifying and appropriately managing these vital parameters timely can be helpful in reducing in-hospital cardiac arrest and death. Therefore, the initiation of rapid response at the first sign of clinical deterioration has helped the medical team for assessing the risk at early stage and effectively manage their care. The objectives of the study illustrated that to assess the effect of an RRS in reducing the code blues in non-ICU in selected hospitals Pune City, to determine the effects of RRS in reducing the incidence of unexpected deaths, cardiac arrest and CPR. Systematic observation of all the non-critical care patients been included in the study. All the data been collected from the health records. The analysis of the study shows that 92% possible codes prevented after implementation of MEWS & RRS which also increases the total number of elective transferring of patient to the Intensive care unit.

Keywords: MEWS: Modified Early Warning Signs, RRS: Rapid Response System, EWS: Early Warning Signs, RRT: Rapid response team, Code blue, Mortality

Introduction

There has been a growing body of research that focus on recognizing and responding to clinically deteriorating patients in general ward settings in the past decade. In 1999, the Audit Commission reported that the effectiveness of critical care services varied between hospitals and recommended the development of early warning systems (EWSs) to help ward staff identify when to call for specialist advice. The original early warning score (EWS) system was designed to enable early detection of patient abnormalities using major vital signs prior to deterioration into a critical illness. The modified early warning score (MEWS) system, which uses modified physiological parameters for scoring, has proven to be a useful tool for predicting deterioration in patients.[1] Many a times patient deterioration not being monitored on the time of physiological changes of the body and responded to in a timely manner. This inattention in patient care has led to an increase risk and incidences of serious adverse events such as unplanned admission to ICU, in-patient cardiopulmonary arrest and unexpected deaths. Improving timely recognition and prompt

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interventions is therefore, pivotal to the provision of safe and quality care to a deteriorating patient before his condition becomes life-threatening.[2]

The purpose of the MEWS is to facilitate prompt communication between nursing and medical staff when deterioration in a ward patient's condition first becomes apparent on the observations chart. The authors intended this system to result in earlier intervention on the ward so that transfer to a critical care facility is either prevented or occurs without unnecessary delay. In addition, a number of health care organizations have implemented Rapid Response Teams (RRTs) to address situations of acute patient deterioration while under hospital care. Research suggests that after implementing a Rapid Response System, hospitals experience a decrease in the number of cardiac arrests, deaths from cardiac arrest, number of days in ICU post arrest, number of days in the hospital after an arrest, and inpatient deaths.

Background

A robust system of Code Blue was in place to be used in situations where patient needed urgent medical attention. This however seemed more like a corrective action and led the investigators to think about implementing an action that would help the patient in preventing untimely collapse. Patient safety being of paramount importance at Hospital a safety initiative to improve early warning signs detection by nurses was rolled out in 2019.

Observational studies suggest that clinical deterioration of patients on non-ICU is often preceded by changes in physiological observation that are recorded by nursing staffs 6 to 12 hours prior to a serious adverse event ((McGaughey, Alderdice, Fowler, Kapila, Mayhew, & Moutray, 2009).[3]

Tarassenko, Hann, & Young, 2006, says that the failure to respond to patient deterioration promptly and appropriately can lead to increased morbidity and mortality, increased requirements for intensive care, and elevated costs. As a result, strategies for detecting at-risk patients in order to trigger the timely intervention of a rapid response team have been developed. These approaches are based on the premise that early recognition of physiologic abnormalities coupled with rapid intervention of suitably trained staff may result in an improvement in functional outcome or mortality rate.

Traditionally, the mews scoring is done on all the patients who gets admitted in the non-critical areas in the hospital. It has helped in identifying early deterioration of clinical condition of patients. However, aggregate weighted system such as Rapid response system have been found to be more accurate for detecting early cardiac arrest and elective transferring of patient to the ICU. Clinical audit of the case records revealed that an early heads up on the clinical condition deterioration could possibly prevent a patient from landing into life threatening emergencies.

Objectives of the Study

- To assess the effect of an RRS in reducing the code blues in non-ICU in selected hospitals Pune City.
- To determine the effects of RRS in reducing the incidence of unexpected deaths, cardiac arrest and CPR.
- To study the practice in daily monitoring.

Research Hypothesis: The research hypothesis for this study was: Applying Modified Early Warning Scores prior to Rapid Response system results in earlier detection of patient deterioration and decreased code blue and in-patient mortality.

Research Methodology

Systematic observation of all the non-critical care patients been included in the study.

Inclusion criteria consisted of any adult's patients admitted to the medical and surgical floor during the study period. Exclusion criteria were patients admitted directly to the intensive care unit from the emergency department or operation room and patients younger than 12 years. All the demographic data were collected from the health records.

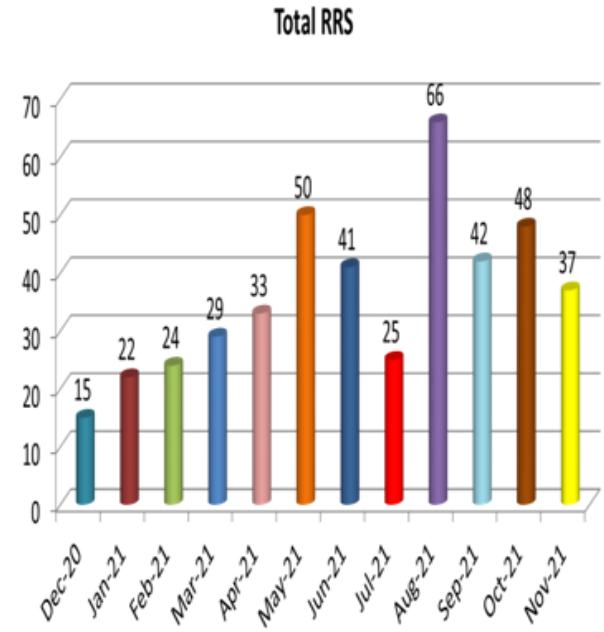

Figure 1: Total RRS data

The above chart shows that maximum escalation of RRS in the month of August (66%), and the minimum escalation done in the initial month of implementation of RRS i.e in December 2020.

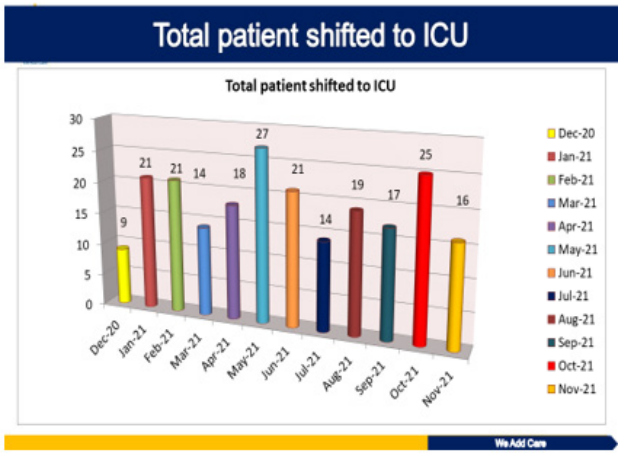

Figure 2: Total patient shifted to ICU

The above chart reveals that the total number of elective transferring of patient to the intensive care unit due to the timely escalation of RRS have been increased consistently.

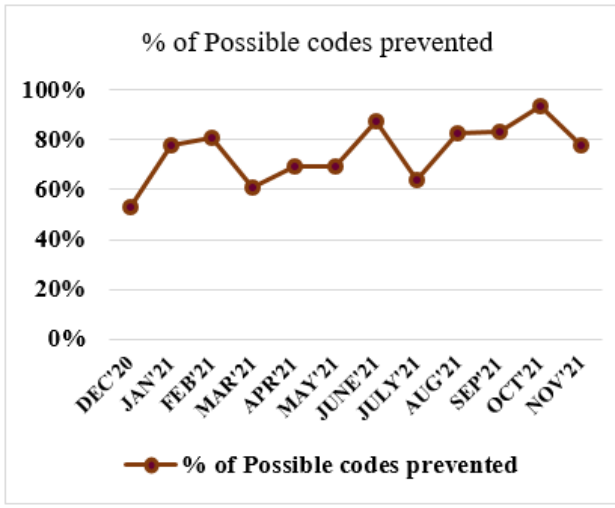

Figure 4: % of possible codes prevented during the study period.

The above line chart shows that the % of possible codes prevented in December 2020 were only 53%, whereas after strengthening the use of MEWS and RRS the % of possible codes prevented up to 94% in the month of October 2021.

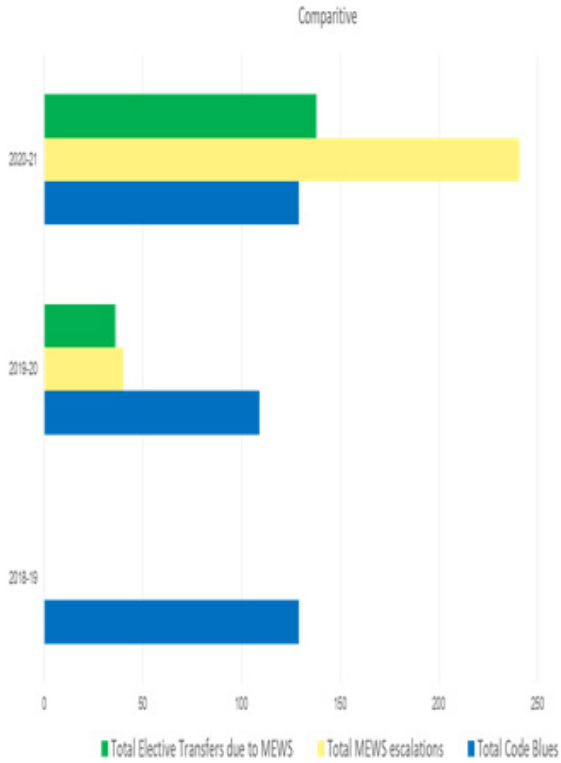

Figure 3: Comparison of code blue before and after the implementation of mews score and total elective transferring due to MEWS.

Discussion

It is now well known that in-patient cardiac arrests are frequently heralded by changes in physiological parameters. Multiple hospitals including ours, initiated MEWS and RRS. However, various methods to assess the decline in physiological parameters have been used in multiple institutions. MEWS is one of the most studied scoring systems used and has been shown to be useful tool to predict in hospital mortality. Moreover, instead of using single trigger criteria or clinical assumptions made by nurses, clinicians and family members, MEWS systems seems to be more objective and systematic way to recognize patient's deterioration. We started MEWS in 2018 and initiated RRS later as a criterion to escalate criticality of patients to the medical teams. The RRS form been collected by the patient safety officer on the same day.

Analysis for last 12 months shows 92% possible codes prevented after implementation of MEWS & RRS which also increases the total number of elective transferring of patient to the Intensive care unit.

Our study has several limitations. First, this was done in a single organization with 24- hrs. internal medicine resident coverage, which would not be applicable in the general hospitals. Also, our findings could be confounded other un-known variables that could affect in-hospital mortality. Moreover, even though the authors made all the attempts to verify all data corrected, some data were incomplete and respiratory rate is poorly assessed and might not be accurate.

Conclusion

Implementation of MEWS and RRS has provided a systematic way to identify at-risk patients and helps in elective transferring of patients in ICU. MEWS and RRS systems affect mortality and discharge to home/ self-care and hospice. Finally, total in-hospital cardiac arrests reduced although there was no statistically significant difference in code blue.

Ethical Clearance: Ethical clearance taken from the hospital ethical committee prior to the study.

Source of Funding: Organization provided funding for the study.

Conflict of Interest: Nil

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