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Original Article

Rapid response team: An early adaptive experience in a tertiary care hospital of Pakistan.

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ABSTRACT

OBJECTIVE

Rapid Response Team (RRT) was assembled in our hospital in 2016. We looked at the early dynamics and features of the rapid response team in the population of patients admitted through the emergency department (ED) in our tertiary care hospital. The main purpose of initiating RRT is to enhance the timely intervention, stabilization and to avoid clinical worsening of the patient prior to cardiopulmonary arrest or other life-threatening events.

METHODS

Retrospective chart review was done, and the rapid response team register was utilized to gather the data regarding each RRT. Admissions from ED between Jan 29, 2016, to Sep 29, 2016 were considered for the study. The total duration of study was 8 months. The RRT data was also taken from the Management Information System (MIS) of the hospital, and the switchboard communication system.

SETTING

Inpatient wards at Shifa international hospital, Islamabad, Pakistan.

RESULTS

Out of four thousand six hundred and sixty seven enrolled patients, calls for RRT were generated one hundred and twenty-two times throughout the study period of 8-months. The age of patients ranged from 18-92 years. The initiator of the RRT was a nurse in 30% of cases while doctors initiated the RRT in 70% of cases. Low blood pressure was one of the most common reasons for calling RRT. 51% of patients were treated on the floor after the RRT while 49% were moved to ICU.

CONCLUSION

Rapid response team is steadily being utilized in the management of acute deterioration in patients. Nursing needs to be empowered and educated to make the RRT initiative a success. Further studies are required to determine if there is a mortality benefit or decreased incidence of in-hospital cardiac arrests in randomized control trials in Pakistan.

KEYWORDS

Rapid response team, Code Blue, Emergency Nursing

INTRODUCTION

In a given day, around one quarter of the patients are admitted through the Emergency department (ED). These patients are admitted to the medical or surgical floor when the admitting doctor feels that such admission is safe for the patient. Inpatient care is challenging as patients admitted through emergency department or through OPD can become too sick and the level of care must be redefined. When these patients get sick, it becomes of utmost important to provide them with safe and appropriate level of care and provide it quickly. It has been observed that due to lack of early recognition and intervention, patients would have to be moved to intensive care units or resulted in unexpected serious consequences. The concept of Rapid Response Team (RRT) was introduced in 2006 in United States to deal with situations where sudden change in clinical status occurs in stable patients. (1) These include changes in vital signs, changes in Glasgow Coma Scale (GCS) or change in cardiac rhythm. It was seen that before deterioration, the patient shows changes in vital signs which could be picked up by the floor nurses and through activation of RRT, further deterioration could be avoided. Nurses are trained to pick up these red flags and initiate RRT upon which a designated member of the team will analyze the patient condition, reassess and take appropriate measures. (2) The nurses taking care of the patients are given a criterion that becomes the reason to call an RRT as shown in table1.

Category	Standard
Airway/Breathing	Respiratory rate <8 breaths per minute, or >28 breaths per minute, Oxygen saturation less than 85 % despite supplementation, Respiratory arrest, if threatened airway
Circulation	Pulse rate <40 beats per minute or >130 beats per minute, Systolic blood pressure <90 mmHg, or > 180 mmHg Uncontrolled bleeding Cardiac arrest
Mental status	An acute significant change in patient baseline mental status, Sudden loss or change of speech Sudden loss sensation Unexpected onset lethargy or agitation, Seizures
Others	Chest pain not relieved by nitroglycerin, Uncontrolled pain, Urine output < 20ml/hour The nursing staff or family has concerns about the patient's state.

Table 1: Rapid Response Team Activation Criteria

Depending on the resources, the rapid response team usually comprises of 2-3 healthcare professionals including critical care nurses, respiratory therapist, intensivist, hospitalist or emergency physicians. [3]

With their early intervention, it is expected that the number of ICU admissions and the sudden inpatient cardiac arrest (code blue) decreases. These teams also known as Medical Emergency Teams have been created in major hospitals throughout the world with the concept of creating a safety net for the patients who will become sick while admitted on the inpatient but less acute service. In a recent meta-analysis including both adult and pediatric population, Maharaj et al concluded that there were overall reduced death rates along with decrease in in-patient cardiac arrests. [4] They also concluded that the presence of a physician in rapid response team was not associated with mortality reduction. Another meta-analysis concluded that Rapid Response Services (RRS) strongly reduced the inpatient mortality as well as rates of unexpected deaths. [5]

In Pakistan, few centers have launched the RRT service. Anwar et al concluded in the pediatric population that RRT has led to a significant decrease in mortality and PICU utilization. [6] The main aim of RRT is to stabilize the patient's condition and to decrease the number of cardiac arrest and frequency of code blue and overall hospital mortality. The RRT activation system was adopted in January 2016 throughout the hospital. [7] The objective of this study is to determine the early dynamics and characteristics of RRT in our setting.

MATERIAL AND METHODS

The study was done through a retrospective chart review at Shifa International Hospital, Islamabad, Pakistan. The record of all patients admitted through emergency room from January 29, 2016 to September 29, 2016 were included in this study who were meeting inclusion criteria. The inclusion criteria were all adult patients (aged 17 years and above) admitted through ED to medical, surgical or labor room. Patient who had a Do Not Resuscitate (DNR) status and those who achieved return of spontaneous circulation (ROSC) after cardiac arrest were excluded from the study.

RRT announcement data was taken from the communication department and the Management Information System provided the demographics. The study was approved by the institutional review board. The data was entered and analyzed in SPSS version 22.

RESULT

During the study period, a total number of 6647 patients were admitted through the emergency department to the inpatient floors out of which 4667 patients were enrolled in the study according to the inclusion criteria. During the same period, RRT was called 122 times on those patients admitted through the emergency department. This makes it 2.6 RRT per 100 patients admitted through the emergency department. The characteristics of RRT are shown in Figures 1-3. Of those patients 66 were males and 56 were females (54% & 46% respectively). In calling RRT, it was the nurse who initiated it 37 (30%) times while

doctors initiated it 85 (70%) times. After the RRT 62 (51%) of patients were managed on the floor while 60 (49%) of patients were shifted to the intensive care unit. The reasons for initiating RRT are depicted in Figure 4

Looking at the reasons of calling the RRT, the data showed that the most common reason was the low blood pressure which was seen 34 times (28%) and then low oxygen saturation was 26 times (21%). The other reasons included low GCS 15 times (12%), respiratory distress 12 times (10%) and arrhythmia 6 times (5%) to name the significant reasons. Most of the RRT calls were initiated on Medicine service patients with 48 calls while nephrology patients were 14 and general surgery 14 calls. As shown in figure 5.

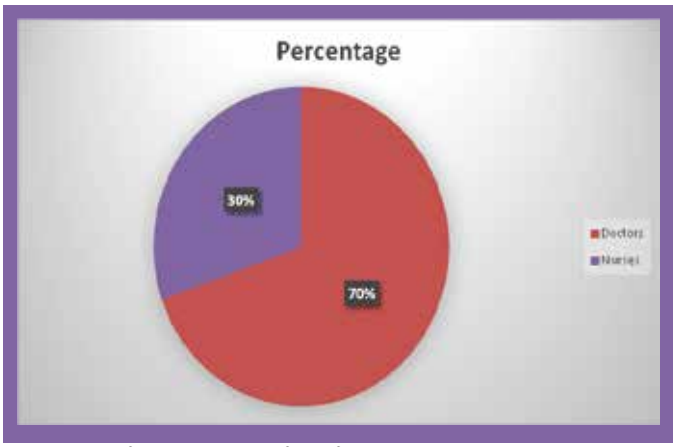

Figure 2: Activation of RRT call by Doctor versus Nurses

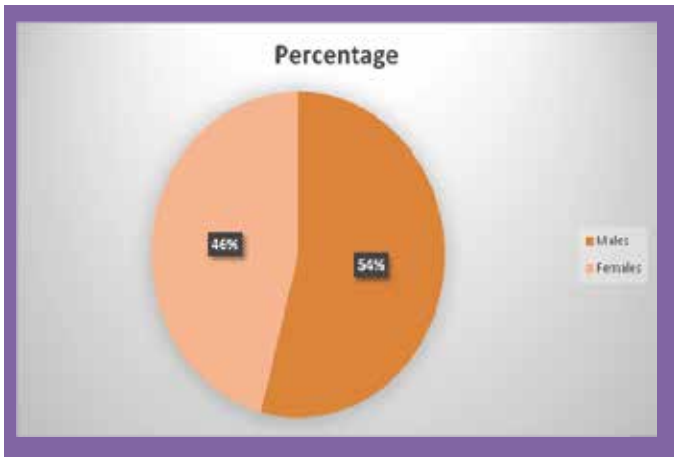

Figure 1: Gender distribution of patients who required activation of RRT

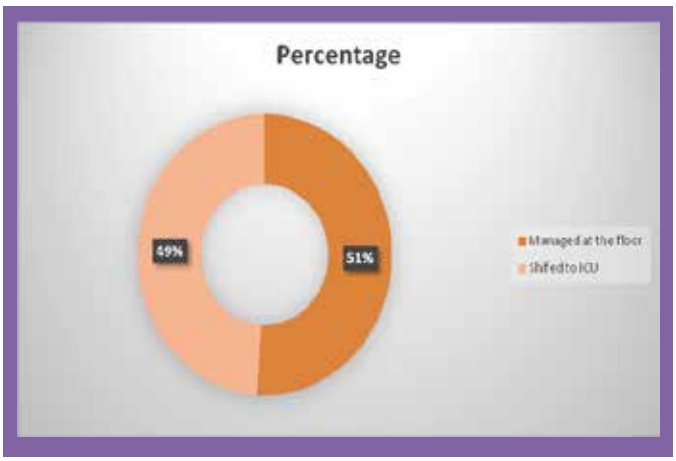

Figure 3: Disposition of patients after RRT was generated

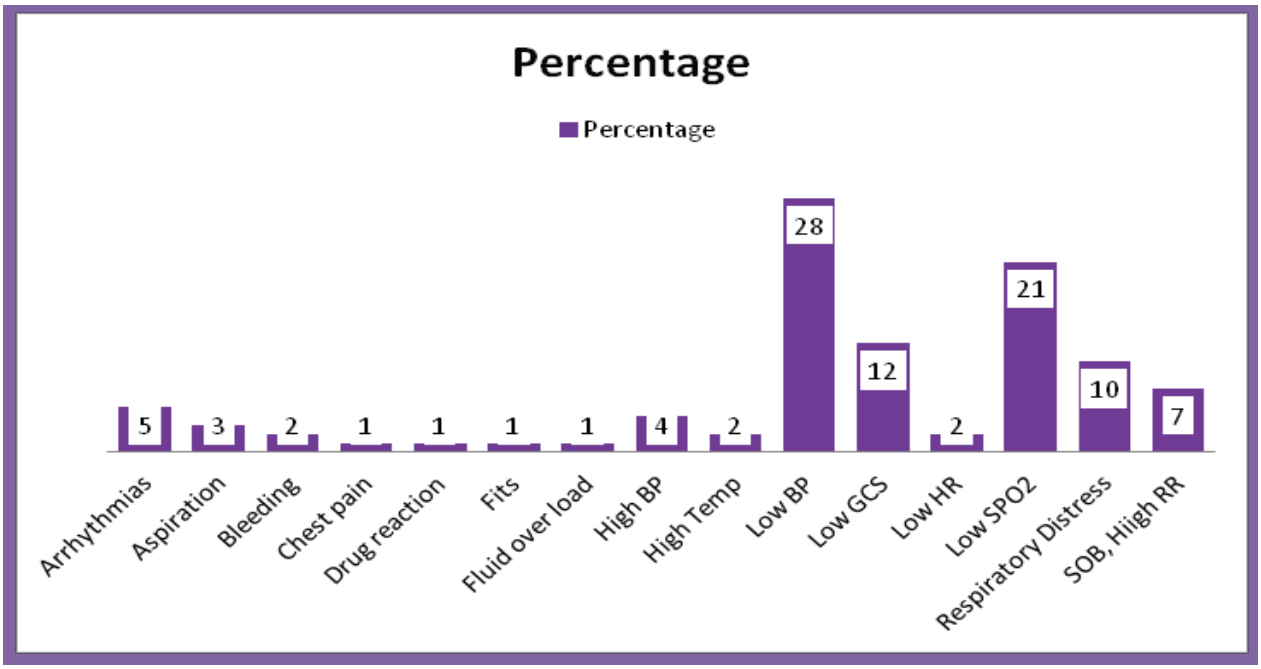

Figure 4: Reasons for initiating RRT

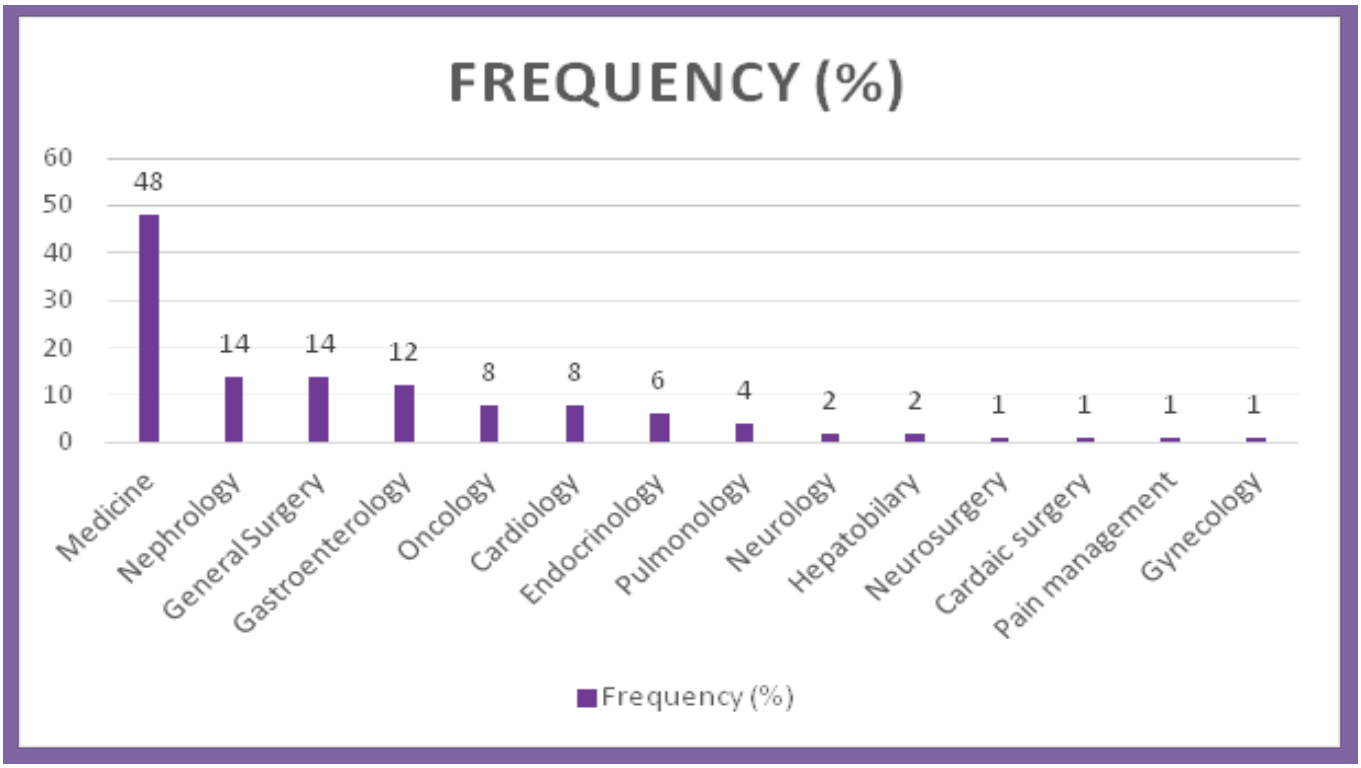

Figure 5: Frequency of RRT in different Specialties

DISCUSSION

Rapid response team is the safety net for the people admitted to the inpatient facility who become sick abruptly and through the RRT we stabilize them to avoid ICU admission or mortality. Since RRT has been established in quite a few places, data has been gathered and it shows a decline in the incidence of cardiac arrest and cardiopulmonary arrest. Other effects including stroke, respiratory failure and severe sepsis which also decreased and so was the ICU admissions. [7]

The data that we collected show quite a few areas that can be of improvement as the concept is new. Our RRT activation was 2.6 patients per 100 admissions which is considerably low as compared to other mature centers wherein a 4-month period, 1151 RRTs were activated. [8] A study on RRT in Brazil discovered a statistically decrease in-hospital mortality rates significantly starting 16.27 mortality per 1,000 discharges to 1.69 mortality per 1,000 discharges subsequent to RRT execution. [9]

The initiation of RRT was done by the nurse in the 30% of the cases, and by the doctor in 70% of times. We expect this number for the nurses to rise as the understanding of nurses will be improved regarding red flags and RRT initiation. It was shown by Braeton et al, who looked at the nurse's behavior towards activating rapid response team. [10] They saw a barrier for the nurses to call in RRT. These constraints include a gradual change in vital signs, lack of adequate information about the patient, the need to justify RRT activities, lack of human resource and informal hierarchy in the inpatient system of the hospital. They feel that removing or at least working on these obstacles will improve the delay and benefit the emergency patient.

Carlos mora et al looked at the epidemiology of early rapid response team activation after emergency department admission. They determined that RRT called within 24 hours of ED admission to inpatient have a 4-fold increase in the risk of in-patient mortality. Those patients show changes in vital signs with greater tachycardia and tachypnoea in the ED. [11]

Although we didn't look at the delay in calling RRT, Barwise et al observed in his study in 2016 that delay in rapid response team activity was frequent (57%) and was independently associated with worse patient mortality and morbidity. [12] Similarly Fernando et al looked at RRT activation outside of normal working hours and found that in their study 55% of RRT were called out of office hours and it resulted in increased odds of mortality, as compared with daytime RRT activation with adjusted OR 1.34, 95% CI 1.26 - 1.40, P= 0.02. [13]

It was interesting to note that the most common reason for the initiation of RRT was low blood pressure seen in 34 cases or 28% of times. The similar findings were seen

in the study of Walston et al which has 948 patients in two groups with study and control arms, and saw that patients who needed RRT within 12 hours of admission were either having tachycardia at the time of disposition or extremes of blood pressure, higher respiratory rate and lower oxygen saturation.[14] Those patients needed more resources and have higher mortality, increased rate of invasive interventions and ICU admissions.

Usually the bulk of patients get admitted under medicine service and the same was reflected in our study. There were 48 (40%) patients out of 122 RRT's which were admitted in medicine. Looking at the outcome of RRT, what we saw was 51% of the cases or 62 patients were managed at floor after RRT and 49% of cases are 60 patients was shifted to intensive care unit. Chan et al reported that after RRT event, patient showed 51.6% clinical improvement, 3.7% moved to a telemetry unit or monitored environment, 0.3% required urgent surgical treatment, and 0.3% were treated with immediate cardioversion. [15]

Looking at the data collected in our study it is seen that although the concept was very new in the hospital, yet we came across very important aspects of care provision. It was obvious that the initiator of RRT was doctors in majority of cases which is not the conventional wisdom, as we expect the nurses to be the initiators, because they provide bedside care. We feel that the issue could be that the nurses were not comfortable in the role and once they learn then we expect most nurses will be initiating the RRT. In our study the most common reason for calling RRT was low blood pressure although similar study from our own institution described the main reason as low GCS. [7] Their data was pooled from all hospital admissions while we looked at only those admissions which were done for the emergency department. We expect the emergency department patients to have more deranged vitals and that may be reflected in our study.

CONCLUSION

Rapid response team has shown to be an important safety net for admitted patients and has shown promise in cutting ICU admissions, code blue and mortality. Nursing education on red flag signs is of prime importance. More outcome studies and competitive study on RRT in patients admitted through ED and inpatients needs to be done in future, to gain more insight into this important aspect of emergency care.

REFERENCES

1. Jung B, Daurat A, De Jong A, Chanques G, Mahul M, Monnin M, et al. Rapid response team and hospital mortality in hospitalized patients. *Intensive Care Medicine*. 2016;42(4):494-504.

2. LeGuen M, Ballueer Y, McKay R, Eastwood G, Bellomo R, Jones D. Frequency and significance of qSOFA criteria during adult rapid response team reviews: A prospective cohort study. *Resuscitation*. 2018;122:13-8.

3. Patel N, Hiltzik Y, Hussain E. Comparison of a Critical Care Attending-and Fellow-Run Rapid Response Team With an Internal Medicine Hospitalist-and Resident-Run Rapid Response Team. *Chest*. 2010;138(4):288A.

4. Maharaj R, Raffaele I, Wendon J. Rapid response systems: a systematic review and meta-analysis. *Critical Care*. 2015;19(1):254.

5. Solomon RS, Corwin GS, Barclay DC, Quddusi SF, Dannenberg MD. Effectiveness of rapid response teams on rates of in-hospital cardiopulmonary arrest and mortality: A systematic review and meta-analysis. *Journal of Hospital Medicine*. 2016;11(6):438-45.

6. Saleem AF, Zaidi S, Haider SR. Experience of pediatric rapid response team in a tertiary care hospital in Pakistan. *The Indian Journal of Pediatrics*. 2010;77(3):273-6.

7. Yousaf M, Bano S, Attaur-Rehman M, Nazar CMJ, Qadeer A, Khudaidad S, et al. Comparison of Hospital-Wide Code Rates and Mortality Before and After the Implementation of a Rapid Response Team. *Cureus*. 2018;10(1).

8. White K, Scott IA, Bernard A, McCulloch K, Vaux A, Joyce C, et al. Patient characteristics, interventions and outcomes of 1151 rapid response team activations in a tertiary hospital: A prospective study. *Internal Medicine Journal*. 2016;46(12):1398-406.

9. Gonçales PDS, Polessi JA, Bass LM, Santos GdPD, Yokota PKO, Laselva CR, et al. Reduced frequency of cardiopulmonary arrests by rapid response teams. *Einstein (São Paulo)*. 2012;10(4):442-8.

10. Braaten JS. CE: Original Research Hospital System Barriers to Rapid Response Team Activation A Cognitive Work Analysis. *AJN The American Journal of Nursing*. 2015;115(2):22-32.

11. Mora JC, Schneider A, Robbins R, Bailey M, Bebee B, Hsiao Y-FF, et al. Epidemiology of early rapid response team activation after emergency department admission. *Australasian emergency nursing journal*. 2016;19(1):54-61.

12. Barwise A, Thongprayoon C, Gajic O, Jensen J, Herasevich V, Pickering BW. Delayed rapid response team activation is associated with increased hospital mortality, morbidity, and length of stay in a tertiary care institution. *Critical Care Medicine*. 2016;44(1):54-63.

13. Fernando SM, Reardon PM, Bagshaw SM, Scales DC, Murphy K, Shen J, et al. Impact of nighttime Rapid Response Team activation on outcomes of hospitalized patients with acute deterioration. *Critical Care*. 2018;22(1):67.

14. Walston JM, Cabrera D, Bellew SD, Olive MN, Lohse CM, Bellolio MF. Vital signs predict rapid-response team activation within twelve hours of emergency department admission. *Western Journal of Emergency Medicine*. 2016;17(3):324.

15. Chan PS, Jain R, Nallmothu BK, Berg RA, Sasson C. Rapid response teams: A systematic review and meta-analysis. *Archives of Internal Medicine*. 2010;170(1):18-26.

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