



Rapid response systems

Barriers to activation of the rapid response system[☆]



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ABSTRACT

Background: The rapid response system (RRS) has been widely implemented in the US. Despite efforts to encourage activation of the RRS, adherence to activation criteria remains suboptimal. Barriers to adherence to RRS activation criteria remains poorly understood.

Objective: To identify barriers associated to activation of the RRS system by clinical staff.

Methods: Physicians and nurses on the medical and surgical wards of a New York City community hospital were surveyed to identify barriers to six criteria for activation of the RRS. A paper questionnaire was disseminated. We assessed familiarity with, agreement with, and recognition of perceived benefit of the RRS calling criteria using a Likert scale. Self-reported adherence to RRS activation was also measured on a Likert scale. Logistic regression was used to assess the association between the barriers and the six RRS criteria.

Results: Sixty eight physicians and 16 nurses completed the survey; response rates were 59% and 35%, respectively. Self-reported adherence rate was $\leq 25\%$ for the six criteria. We observed that as the familiarity with, agreement with, and perceived benefit of activating the RRS increases, the self-reported adherence also increases.

Conclusions: Adherence to activation of RRT based on the six criteria measured is low. As familiarity with, agreement with, and perceived benefit of the RRS activating criteria rise, self-reported adherence rates increase, with familiarity having the greatest impact. These results can be used to develop tailored interventions to increase adherence to RRT activation in health care institutions.

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1. Introduction

Serious adverse events among hospitalized patients are associated with an increase in morbidity and mortality, and have become an area of concern to healthcare institutions internationally.^{1–7} Studies have shown that many fatal adverse events do not occur suddenly and are usually preceded by abnormal vital signs that appear transiently or continuously minutes to hours before and which are insufficiently treated.^{8–10}

In an attempt to reduce the rates of preventable fatal adverse events, the rapid response system (RRS) was developed.¹¹ Its major role is to provide early coordinated intervention to patients with warning signs and prevent the occurrence of serious adverse events

by detecting quickly patients who deteriorate and responding swiftly and effectively with a rapid response team (RRT) or medical emergency team (MET).¹² Its benefits include reduced hospital mortality, reduced ICU days, and earlier identification of trends of deterioration that give hints to faulty processes. Since its development over two decades ago, it has been widely adopted by healthcare institutes as a marker of quality of care and patient safety, and as a life-saving initiative.^{2,9,13–15}

Even though the RRS has been widely advocated and adopted, there is still evidence of ongoing suboptimal activation of this system in hospitals where it has been implemented. Studies have shown no activation of the RRS after a patient met the criteria in 30% to 78% of cases, and a median delay of 16 h in RRS activations from the time patient met the criteria.^{16–19} Several studies attempting to identify reasons behind sub-optimal activation rates have been carried out, mostly among nurses and in non-US settings.^{20–25} Barriers to optimal RRT implementation in the United States are still unclear. Our study aimed to assess the types and prevalence of some of these barriers.

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Table 1
Criteria for activating the rapid response team.

Heart rate (HR)	<45 or >125 Beats per minute
Mean arterial pressure (MAP)	<70 or >130 mmHg
Respiratory rate (RR)	<10 or >30 per minute
Oxygen saturation (O ₂ %)	<92%
Patient 'not looking right'	
Change in mental status	

2. Methods

2.1. Setting

The study was conducted in the medical and surgical wards at Harlem Hospital Center, a 286 bed Level 1 Trauma Center located in Manhattan, New York. The hospital has 14 adult ICU and 6 CCU beds, and has a functional RRS system that can be activated by any hospital personnel 24/7. Responders for the RRS call follow the MET model: a physician (senior medical resident), an ICU nurse and a respiratory therapist. Hospital policy requires every new employee to get a primer on the RRS during orientation, and there are yearly grand rounds on RRS activation offered in the institution. In addition, there are posters listing the RRS activation criteria and how to activate the RRS on the medical and surgical wards. Preliminary data from 2013 show that about 30% of RRS events had delays in their activation, 54% of RRS events led to ICU/CCU transfers, and the cardiac arrest rate was under 2 per 1000 admissions. The target population that was eligible for our study consisted of attending physicians, physicians in training, and nurses employed on the medical and surgical wards. Participation was voluntary, anonymous, and confidential.

2.2. Study instrument

A self-administered questionnaire was used. It is a modified version of two previously developed and validated questionnaires for assessing barriers^{22,26} (Appendix A). Physicians and nurses were asked to report their adherence to six RRS triggering criteria (Table 1). Physicians and nurses reported whether they were adherent to each guideline component on a 5-point Likert scale: 0% to 25%, 26% to 50%, 51% to 75%, 76% to 99%, or 100% of the time. A self-reported adherence of >75% was classified as adherent to that recommendation.

Barriers to RRS activation were assessed using the theoretical model of knowledge, attitude, and behavior.^{27,28} The principle of this model is that for recommendations to be incorporated, health care personal must overcome a series of internal barriers (directly related to the provider) and external barriers (outside the provider's control). Internal barriers are considered to affect adherence through the components of knowledge and attitudes. To assess knowledge, we asked the physicians and nurses to rate their familiarity with each of the RRS triggering criteria using a 4-point Likert scale ranging from not familiar to very familiar. To assess attitudes

Table 3
Prevalence of the main potential barriers assessed*.

Barrier	Familiarity with criteria %		Agreement with criteria %		Perceived benefit of criteria %	
	Unfamiliar	Familiar	Disagree	Agree	No benefit	Benefit
HR	28.6	71.4	22.7	77.3	17.9	82.1
MAP	30.9	69.1	25	74	15.5	84.5
RR	30.9	69.1	14.3	85.7	9.5	90.5
O ₂ %	31	69	34.9	65.1	22.4	77.6
Mental status change	23.8	76.2	14.7	85.3	11.9	88.1
'Not looking right'	34.5	65.5	21.5	78.5	14.3	85.7

* Barriers were dichotomized at the midpoint.

Table 2
Characteristics of survey respondents.

Characteristic	n	%
Department		
Medicine	67	80
Surgery	17	20
Level		
PGY 1–2 physician	53	63
PGY 3–6 or Attending physician	15	18
RN	16	19
Years since completing professional school		
<5 yrs	25	30
5–10 yrs	46	55
>10 yrs	10	12
Have initiated a RRT call	58	69
Have responded to a RRT call	74	88
Perceived adequacy of RRS training*		
Inadequate	55	65
Adequate	29	35

* Dichotomized at the midpoint.

we asked them to rate their level of agreement with the criteria and their perceived benefit of the criteria, using a 4-point Likert scale (strongly disagree to strongly agree and no benefit to large benefit, respectively). External barriers were not assessed in the survey.

2.3. Statistical analysis

Univariate analysis was performed using logistic regression analysis to test whether the barriers identified by the conceptual model (lack of familiarity, disagreement with the criteria and low perceived benefit) were individually associated with self-reported adherence to each guideline component. All *p*-values were considered statistically significant if the value was less than 0.05 (double sided α). Analysis was conducted using SPSS v 16.

3. Results

Eighty-four staff members (81% physicians and 19% nurses) completed the survey. 115 (85%) of the eligible physicians and 46 (77%) of the eligible nurses were handed a survey. 68 (59%) of the physicians and 16 (35%) of the nurses responded. Demographics of respondents are shown in Table 2. Self-reported adherence rates for triggering the rapid response system were relatively low across all six criteria measured. The adherence rates for the six activation criteria were: HR = 17.8%, MAP = 14.2%, RR = 21.4%, O₂% = 22.6%, mental status = 25%, "Not looking right" = 23.9%.

The prevalence of the potential barriers to RRS activation differed among the six RRS triggering criteria (Table 3). Survey respondents were most familiar with the mental status change criteria. On the other hand, they "agreed" most with the RR criteria and believed the RR criteria had the most benefit. "Unfamiliarity with the criteria" was the barrier with the highest aggregated weight (24–35% of responders were unfamiliar with the various criteria). Triggering the RRS for a change in mental status had the least

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