Background

Rapid response systems (RRSs) aim to identify and rescue hospitalized patients whose condition is deteriorating before respiratory or cardiac arrest occurs. Previous studies of RRS implementation have shown variable effectiveness, which may be attributable in part to barriers preventing staff from activating the system.

Objective

To proactively identify barriers to calling for urgent assistance that exist despite recent implementation of a comprehensive RRS in a children’s hospital.

Methods

Qualitative study using open-ended, semistructured interviews of 27 nurses and 30 physicians caring for patients in general medical and surgical care areas.

Results

The following themes emerged: (1) Self-efficacy in recognizing deteriorating conditions and activating the medical emergency team (MET) were considered strong determinants of whether care would be appropriately escalated for children in a deteriorating condition. (2) Intraprofessional and interprofessional hierarchies were sometimes challenging to navigate and led to delays in care for patients whose condition was deteriorating. (3) Expectations of adverse interpersonal or clinical outcomes from MET activations and intensive care unit transfers could strongly shape escalation-of-care behavior (eg, reluctance among subspecialty attending physicians to transfer patients to the intensive care unit for fear of inappropriate management).

Conclusions

The results of this study provide an in-depth description of the barriers that may limit RRS effectiveness. By recognizing and addressing these barriers, hospital leaders may be able to improve the RRS safety culture and thus enhance the impact of the RRS on rates of cardiac arrest, respiratory arrest, and mortality outside the intensive care unit. (American Journal of Critical Care. 2014;23:223-229)
Rapid response systems (RRSs) were developed with the goal of reducing rates of cardiac arrest, respiratory arrest, and mortality outside the intensive care unit (ICU).1 RRSs include identification and response components. The identification component helps clinicians outside ICUs recognize patients at high risk of deterioration condition. The response component enables staff to quickly summon a medical emergency team (MET) to the bedside of patients exhibiting signs of clinical deterioration.2 RRSs have been widely implemented in hospitals throughout the world.3,4

The effectiveness of METs in reducing cardiac arrest rates and mortality is controversial. The only cluster-randomized study at the hospital level was performed in adults and showed no significant difference between control and intervention sites.5 Findings from before and after studies in children are mixed, with some investigations demonstrating significant improvements, and others showing no major changes in outcomes with RRS implementation.6,12 Experts have suggested that the variation in effectiveness may be attributable to barriers preventing staff from calling the MET, such as fear of criticism or resistance from others, reliance on the traditional system, and lack of self-efficacy.5,13-21 These barriers may lead to inconsistent RRS use, dampening the intended effects. An in-depth understanding of the barriers to calling the MET will enable hospitals to address these issues directly, potentially leading to improvements in morbidity and mortality rates.

In this study, we sought to proactively identify and understand barriers to calling for urgent assistance in a children’s hospital where an RRS had recently been implemented.

Methods

Overview

We conducted semistructured interviews with nurses and physicians at The Children’s Hospital of Philadelphia (CHOP) between May and October 2011. The findings described in this manuscript represent 1 component of a study that evaluated multiple distinct aims. In addition to understanding the barriers to calling the MET as part of the RRS, the larger study also aimed to (1) evaluate the mechanisms by which early warning scores (EWSs) affect safety,22 (2) identify specific factors that contribute to false-negative and false-positive EWSs, and (3) assess the role of patients’ families in the recognition of deteriorating condition and MET activation.23

Setting

CHOP is an urban, tertiary care pediatric hospital with 530 beds, 203 of which are dedicated to intensive care. An RRS has been fully implemented in all of the general medical and surgical care areas since February 2010. It consists of (1) an identification component including criteria for calling a MET and an EWS with corresponding care guidelines, and (2) a response component with a 30-minute response MET available for activation by any clinician for any clinical concern (independent of the EWS), 24 hours per day, 7 days per week. For concerns that cannot wait 30 minutes, any hospital employee can activate...
Interrater discrepancies were discussed among the team and resolved by consensus. We combined codes into major themes with the guidance of key related literature, which we consulted frequently during the analysis. After all the transcripts were coded, we used the query function in NVivo to help us examine patterns and relationships among themes, ultimately formulating theories about the data. After reviewing and finalizing the major themes, we identified quotations representative of these themes for presentation in this manuscript.

**Human Subjects**

The CHOP institutional review board approved this study. All participants provided written informed consent.

**Results**

**Participants**

A separate aim of our work was to evaluate false-positive and false-negative EWSs; thus, we sampled eligible nurses and physicians who provided care for children less than 18 years old who were hospitalized in general medical or surgical care areas and had false-negative or false-positive EWSs. Recruitment ceased when we reached thematic data saturation. Our identification of this point in the study was guided by work from Guest et al., who describe data saturation as the point at which no new themes and/or no new codes emerge with additional interviews.

**Data Collection**

Through a detailed review of the relevant literature and consultation with experts, we developed a semistructured interview guide, which included open-ended questions that elicited nurses’ and physicians’ viewpoints regarding the barriers and facilitators to activating the MET.

Experienced qualitative research scientists (F.K.B. and J.H.H.) trained and supervised 2 study interviewers (B.P. and K.M.T.). We selected interviewers who were not clinicians and were not involved in the administration of the RRS to reduce the pressure for participants to give responses that satisfy their superiors, colleagues, or those greatly invested in the RRS’s operations. In doing so, we minimized social desirability bias. Each interview was digitally recorded, professionally transcribed, and imported into NVivo 8.0 software for analysis (QSR International).

**Analysis**

We used a modified grounded theory approach to analyze the data. After a line by line reading of the text, we developed a set of codes that we used to identify key ideas in the data. To facilitate interrater reliability, each code was given an explicit definition that included examples of appropriate applications of the code. In weekly meetings, we generated hypotheses about the data that were based on insights that arose during the interviews and the coding process. Results of these discussions were included in memos about the data and were coded as part of the data set as well. We used the Constant Comparative Method to compare newly collected data with codes and concepts that had emerged from previously collected data in order to guide further development of a framework. Two members of the research team coded each interview independently.

Interrater discrepancies were discussed among the team and resolved by consensus. We combined codes into major themes with the guidance of key related literature, which we consulted frequently during the analysis. After all the transcripts were coded, we used the query function in NVivo to help us examine patterns and relationships among themes, ultimately formulating theories about the data. After reviewing and finalizing the major themes, we identified quotations representative of these themes for presentation in this manuscript.

**Theme 1: Self-efficacy**

Self-efficacy is the perception that one has the necessary skills and abilities to perform a behavior, even in the face of specific barriers or obstacles. We found that self-efficacy in recognizing clinical deterioration and activating the MET were strong determinants of whether care was escalated in a timely fashion for children whose condition was deteriorating.

Nurses, especially those with fewer than 2 years of experience, often doubted their ability to recognize
deterioration in a patient’s condition. These misgivings were exemplified by 1 participant, who said, “I’ve definitely had some situations where I have been able to recognize it and others where I have almost second guessed myself and wondered if they are really deteriorating.” Medical residents also reported questioning their own skills in recognizing such deterioration, along with concerns that their clinical decision making would be evaluated. One resident said, “I think you just always feel like there is that judgment on you. Is this a good CAT call? Is there a real reason to be concerned or are you just not thinking things through or being excessively worried about something that is not as big of a deal as maybe you think it is?”

Even among participants who were confident in their ability to recognize clinical deterioration, a lack of self-efficacy in regard to independently activating the MET was present in some. As a result, these participants reported that they often consulted a more experienced colleague first or left the decision entirely to another person. A medical nurse with less than 1 year of experience said, “I’m new, but if I got a senior nurse’s opinion, then I would feel comfortable.” A surgical nurse with less than 1 year of experience explained, “I think it made me more comfortable that it was the charge nurse’s decision and that she seemed to feel very strongly about it.”

More experienced nurses also discussed lack of self-efficacy as a barrier. Some expressed regret that they had not been more assertive in situations involving delays in escalation of care. When describing a MET activation, a medical nurse with 23 years of experience said, “In retrospect, I wish I would have pushed [to escalate care] an hour earlier... either I wish I had pushed more or just said I am calling the CAT team now.” Others recalled working with less experienced staff who experienced distress and regret when, faced with barriers, they failed to escalate care. A medical nurse with 3 years of experience described 1 of these episodes: “She did touch base with the resident a couple times and the resident was like, ‘I think it is okay. We will just keep an eye on him,’ or, ‘How about we just go up on his oxygen.’ He ended up coding a couple hours later and she was so upset because she knew something was wrong, and she wished she had gone to the charge nurse and really expressed her concerns.”

Conversely, we found the presence of self-efficacy to be a key facilitator in overcoming hierarchical norms and resistance in order to initiate escalation of care to the MET. Making the decision to advocate for patients through activation of the MET was a gratifying moment for a medical nurse with less than 1 year of experience: “It was one of my proud nights where I went home and I was like, I was a good nurse.”

Attending physicians did not express any lack of self-efficacy regarding recognition of deteriorating condition or activation of the MET. A medical attending physician with 17 years of experience said, “I think I am a pretty good doctor. I am very confident in my skills. I also know when I am in over my head.” Even if the care team was not in agreement about escalating care, attending physicians felt comfortable making the call.

### Theme 2: Perceptions of Hierarchy

Many participants discussed the importance of preserving relationships within their own care teams. Although this is a key characteristic of successful teams, these relationships may become problematic when they prevent clinicians from seeking assistance from the MET.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%) of respondentsa</th>
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<tr>
<td></td>
<td>Physicians (n = 30)</td>
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<tr>
<td>Race</td>
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<tr>
<td>Asian</td>
<td>2 (7)</td>
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<tr>
<td>Black</td>
<td>0 (0)</td>
</tr>
<tr>
<td>White</td>
<td>26 (87)</td>
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<tr>
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<td>1 (3)</td>
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<tr>
<td>More than 1 race</td>
<td>1 (3)</td>
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<tr>
<td>Ethnicity</td>
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<tr>
<td>Hispanic/Latino</td>
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<tr>
<td>Not Hispanic/Latino</td>
<td>23 (77)</td>
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<tr>
<td>Prefer not to say</td>
<td>5 (17)</td>
</tr>
<tr>
<td>Sex</td>
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<tr>
<td>Female</td>
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<tr>
<td>Male</td>
<td>14 (47)</td>
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<tr>
<td>Medical</td>
<td>21 (70)</td>
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<tr>
<td>Surgical</td>
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<tr>
<td>Experience level of physician</td>
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<tr>
<td>Attending</td>
<td>16 (53)</td>
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<tr>
<td>First-year resident</td>
<td>7 (23)</td>
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<tr>
<td>Second-year resident or above</td>
<td>7 (23)</td>
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<tr>
<td>No. of years practicing as an attending physician (n = 16)</td>
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<tr>
<td>&lt;5</td>
<td>8 (50)</td>
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<td>5-10</td>
<td>3 (19)</td>
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<td>&gt;10</td>
<td>5 (31)</td>
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<td>No. of years practicing as a registered nurse</td>
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* Because of rounding, percentages may not total 100.
Although the general intraprofessional and interprofessional hierarchies were acknowledged and were considered largely acceptable, hierarchical barriers were sometimes challenging to navigate and led to delays in care for patients whose condition was deteriorating. One medical resident stated, “I think you are always worried to think the attending will be mad or something when you are calling the CAT . . . I remember on one case when I was on call and a resident of mine was calling the attending. [The attending] thought it was completely unnecessary to call the CAT. She was giving the resident push back. But the resident and the nurse didn’t feel comfortable and they called the CAT, and the kid ended up going to the ICU. The attending was mad.”

Some participants discussed the challenges of overcoming such resistance. A medical nurse with 2 years of experience shared an example of this: “I felt very uncomfortable with the patient. She was very sick. I felt resistance from every member of the team. That made me hesitate to speak up. I did speak up several times, but then I stopped. I spoke up so many times saying, ‘This is not okay. I am extremely concerned.’ Multiple times, but I never said, ‘No, that’s it.’ I just didn’t take that last step. I felt the resistance.”

Attending physicians discussed the contradictions in policies versus social norms related to hierarchy. A surgical attending physician with 8 years of experience said, “There’s some, like, hierarchy, or [the nurses] are worried about being yelled at or something for no reason. There are some unwritten social norms that are kind of uncool that they feel—especially brand new nurses—that surgeons are scary and so they won’t pick up the phone.”

In response, nurses and residents described mechanisms to overcome these hierarchical barriers, such as teaming up with the charge nurse. This was evidenced by a medical nurse, who said “[The resident] will say ‘I don’t think it is necessary.’ But if both myself and the charge nurse feel it’s necessary [and say so]…usually it spurs [the resident] to come to the bedside to evaluate [the patient]…I was grateful the charge nurse was firm and said, ‘No, we have to. It is our policy if they are in the red, we err on the side of caution so we are calling.’ It took the pressure off me. I am very grateful to have the charge nurse be the go-between because I am not always comfortable.”

Theme 3: Expectations of the Outcomes of MET Activations

We found that expectations of the outcomes of MET activations and related pediatric ICU (PICU) transfers could strongly shape behavior due to previous experiences. Many subspecialty attending physicians seemed to be hesitant to send their patients to the ICU for fear of inappropriate management. A nurse with more than 2 years of experience shared, “I feel our attending physicians are so hesitant to send patients to the PICU, and are really resistant to these CAT calls . . . I think the doctors and the parents think that the PICU doesn’t properly care for these patients.” A medical attending physician validated this perception, “If I was managing a patient who I knew was very sick in one way and was apprehensive about sending him to the PICU because they would manage it differently . . . I would pray that what I [was doing in the general care area] worked because I knew the alternative was much worse for the patient.” Another attending expressed similar views, “When kids go into the PICU, we lose a lot of control. We fight over what is appropriate. Obviously, we are right. We are very invested in how the patients are going to do and it is a personal ownership of their outcome.”

On the other hand, some nurses and residents feared resistance and criticism from the MET. A nurse with more than 2 years experience shared “CAT came down to see him . . . they thought he was stable to stay on the unit and I wasn’t comfortable with it. [Eventually] he ended up going to the PICU and he died 2 days later. It was just frustrating because it had been going on over 12 hours.” One medical resident described criticism from the MET: “The only reason [calling CAT] makes me nervous . . . is because I know I am going to have to go through a lot of justifying when the CAT team arrives about why we called.”

Those with positive previous experiences reported that they were more likely to activate the MET quickly. A medical nurse with more than 2 years of experience noted, “From this experience, I know that I am very confident to say, ‘Well this baby is working too hard [to breathe], let’s at least call them.’”

Discussion

In this study, we aimed to identify barriers to calling for urgent assistance despite implementation of a comprehensive pediatric RRS. Three major barriers emerged: (1) lack of self-efficacy, (2) perceptions of hierarchy, and (3) negative expectations of the outcomes of MET calls.
Several studies have examined nurses’ perceptions of RRSs, but few have examined those of physicians, and only 1 study did so in a children’s hospital. Our findings validate and expand upon those of that lone pediatric study, described by Azzopardi and colleagues. In both studies that examined perspectives of nurses and physicians, established hierarchies, criticism by the MET, and lack of self-efficacy prevented clinicians from seeking assistance from the MET. Hierarchy and lack of self-efficacy were also stronger barriers for nurses and inexperienced clinicians than for others.

RRSs are one of many safety tools that have been implemented in hospitals across the country. The Silent Treatment study described the successes and limitations of such tools—many of which work by warning caregivers of potential problems. These warnings improve safety only when the clinicians using them are able to speak up and then influence others. When a lack of self-efficacy, perceptions of hierarchy, and/or negative expectations stop clinicians from speaking up, the RRS is misused.

In addition to validating previous findings, we discovered that our results reflected an established theoretical framework, the Integrated Behavioral Model. Combining concepts from the Theory of Reasoned Action/Theory of Planned Behavior, Health Belief Model, and Social Cognitive Theory, this model asserts that the direct determinants of behavioral intention are self-efficacy, norms, and attitudes. Applied to utilization of RRSs, the target behavior is activating the MET for patients whose condition is deteriorating. We demonstrated that self-efficacy in recognizing clinical deterioration and activating the MET were both critical in determining whether care was escalated. Additionally, we found that existing hierarchical norms among nurses and physicians can contribute to delays in MET activation, as clinicians wait in order to seek the approval of others who are above them in the hierarchy. We also found that attitudes about expected MET call outcomes were a driver of behavior in activating the MET. The Integrated Behavioral Model has been used to frame our findings and provides a framework for the design of future interventions based on the findings.

This study has several limitations. First, it is possible that the physicians and nurses who participated held more polarized opinions than did those who did not participate, creating selection bias. Second, participants worked in a tertiary-care pediatric hospital, and our results may not be generalizable to all hospital settings. Third, the composition of our MET, consisting of an ICU physician or nurse practitioner, ICU nurse, and ICU respiratory therapist, may differ from the composition of other METs. Thus, responses may differ when referring to METs of different composition. Finally, we did not interview MET responders or patients’ families. An understanding of their perspectives may lead to a more complete understanding of the barriers to calling the MET.

In conclusion, the results of this study offer an in-depth evaluation of the barriers that limit RRS effectiveness. By recognizing and addressing these barriers, hospital leaders may be able to improve the RRS safety culture and thus enhance the impact of the RRS on rates of cardiac arrest, respiratory arrest, and mortality outside the ICU.

FINANCIAL DISCLOSURES
This project was funded by the Health Research Formula Fund Grant 4100050891 from the Pennsylvania Department of Public Health Commonwealth Universal Research Enhancement Program (awarded to Keren and Bonafide) and the CHOP Nursing Research and Evidence-Based Practice Award (awarded to Roberts). The funders did not influence the study design; the collection, analysis, or interpretation of data; the writing of the report; or the decision to submit the article for publication. The authors have no other conflicts to report.

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Barriers to Calling for Urgent Assistance Despite a Comprehensive Pediatric Rapid Response System
Kathryn E. Roberts, Christopher P. Bonafide, Christine Weirich Paine, Breah Paciotti, Kathleen M. Tibbetts, Ron Keren, Frances K. Barg and John H. Holmes

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