

Rapid Response Systems Across Multisite Locations of a Pediatric Hospital System: Patient Characteristics Matter Most

Amanda Levin, MD, Alexander Conostas, MD

Rapid response systems (RRSs) have become a common presence in hospitals globally since their first formal description by Lee et al¹ in 1995. Given the success of these teams at improving pediatric outcomes, rapid response team implementation in pediatric institutions has an established foothold as well, spreading from tertiary hospitals to affiliated satellite institutions and community hospitals. The gap in knowledge now is how patient outcomes may vary across these settings and what features of RRSs and escalation systems need adaptation or are not relevant.

In the article by Bavare et al,² the authors have designed a multisite single institution retrospective observational study to evaluate patient characteristics, outcomes, and use differences between sites with similar RRSs. The strength of this study is the relatively consistent framework and policies implemented from an institutional level at sites where patient characteristics, staffing experience, subspecialist availability, and other contextual factors vary significantly. The authors present the principles of a “realist evaluation” to consider the effects of local context and social structure on program performance.³ A total of 2935 rapid response team activations were evaluated across 3 medical campuses (1816 at the central campus and 405 at 2 satellite campuses). As would be expected, there was a larger proportion of medically complex patients at the central campus. Although the central campus and satellite campuses had identical RRS protocols, they had variations in team composition. Central campus teams were led by postdoctoral fellows or ICU attending physicians, whereas satellite campus teams were led by a critical care advanced practice provider.

Several interesting and important findings were highlighted by Bavare et al.² First, rapid response teams were activated primarily by nurses at the central campus, whereas attending physicians were activated more frequently at the satellite campuses. Second, acute respiratory compromise and cardiopulmonary arrests at the time of rapid response team calls were rare, and rates were no different across all sites. Third, ICU length of stay (LOS) was higher at the satellite sites. The reason for this discrepancy is unclear. However, the authors suppose it may be due to higher stepdown bed availability at the central campus and a proportionally higher number of ICU beds at the

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satellite campuses. Finally, and most importantly, although initial data were used to suggest that mortality at discharge was higher for the central campus than the satellite campuses, a thoughtful multivariate analysis revealed no difference in mortality between the campuses when controlling for patient factors such as severity of illness and presence of complex chronic conditions. This was also true when considering hospital LOS and rapid escalation-associated clinical transfers, an outcome variable representing all transfers who require ventilator (invasive or noninvasive) and/or hemodynamic support within 24 hours of transfer to the ICU. The authors accurately conclude that these findings suggest “that RR [rapid response] team organization and use factors...do not independently affect outcomes”; rather, patient variables do.

A key limitation of this study, its retrospective design, is well identified, and the authors highlight the fact that making accurate assessments of patient severity of illness and risk of mortality was less reliable because of this.² Also, the authors state in their discussion that “another area that will need modification is incorporating specific training scenarios based on differences in the patients and disease patterns served by different campuses.” Although a reasonable consideration, there was no description as to why current practices require this modification and how RRS outcomes are being impacted by current training scenarios. Developers of training may need to consider available resources, such as availability of stepdown beds, consultants, or even considerations for transfer to the central campus. Because the authors have established patient and use data from each site, changes in training or modifications specific to local context may be compared to these data.

In current literature, researchers affirm that variability in RRS design does exist across pediatric institutions and assessment of pediatric outcome after rapid response team activation is not clearly standardized.^{4–8} Because of this, comparing results across heterogeneous pediatric hospitals is difficult. The unique

needs of pediatric patients at satellite hospitals and community hospitals are also considered in the literature (limited service or subspecialty access, staffing differences, potential limitations for escalating care within the hospital, and transport needs), although the use of RRSs at these sites is not well described.^{9,10} This study is valuable in helping to answer questions of rapid response team performance across different pediatric sites. We were reassured to see similar patient outcomes with variability in patient populations, team composition, and use.

We were interested in differences between who led the team and who called the rapid response team. Available adult data reveal that team composition does not affect patient outcomes.¹¹ Although RRSs do improve outcomes, a delay in activation is associated with increased hospital mortality, morbidity, and LOS in adults, and there are concerns of lack of nursing empowerment to activate rapid response teams.^{12,13} Given the finding by the authors that attending physicians were more likely to activate a rapid response team in satellite campuses, we might worry that this might represent a delay in escalation in deference to hierarchy. Alternatively, the satellite campuses may experience closer relationships between nurses and attending physicians, with a shared culture of asking for help and escalation of care. Again, we are reassured by the similarity in patient outcomes.

Lastly, we must consider the value of RRS implementation in general. Although there is a large collection of evidence demonstrating the beneficial impact RRSs have on pediatric patient outcomes and adverse events, the mortality benefit may be overstated. Kutty et al¹⁴ recently found that there was no association between implementation of pediatric rapid response teams and risk-adjusted mortality at the hospital level.¹³ Perhaps, the important element is creating a culture and mechanism to ask for help. The authors describe a well-organized framework and established procedures guiding rapid response teams across their hospitals. We might interpret the results of this review (with variation in site, team

composition, etc) to strengthen the argument that the important elements of success are creating a culture and mechanism to ask for help and escalate.

Ultimately, the clinical implications of both the subject of this review and the pediatric literature discussed are used to indicate that patient-dependent factors weigh far more heavily on patient outcomes than do RRS-dependent factors. We must be prudent not to discount the value that a well-designed and well-implemented RRS may bring to specific institutions. It is clear that continued thoughtful evaluation will be used to provide valuable insight into how these evolving systems are affecting patients, providers, and hospitals.

Bavare et al² should be commended for this evaluation of RRSs across varying pediatric facilities within the same health system. We continue to find that across large numbers of patients and heterogeneous settings, patient illness severity, not RRS characteristics, appears to be the primary influencer of patient outcomes. Through the realist evaluation in this study, we are reassured that perhaps social structure and local context do not result in varying patient outcomes after rapid response activation. It follows that institutions may be reassured when implementing systems that are informed by existing resources and local context.

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