Short Editorial

You Can Only Improve What You Measure: The Importance of the Rapid Response Team in Improving Patient Care

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Short editorial related to the article: Prospective Longitudinal Study on Mortality and Quality of Care for Ward Patients Following Rapid Response Team Implementation in Brazil

Sudden death among hospitalized patients, most often manifesting as in-hospital cardiac arrest, is a global problem that poses major challenges for prediction, timely diagnosis, and expeditious treatment.[1] Incidence and outcomes vary considerably across health systems but remain sobering. Hospitalized patients with acute illness are vulnerable to intercurrent events that can precipitate rapid deterioration. Caring for these patients requires advanced competencies, such as airway management, treatment of arrhythmias, and hemodynamic support, all of which are challenging to acquire and maintain across all medical professionals on general wards. This is why rapid response teams have been utilized as a system-level strategy to recognize early deterioration of patients and bring concentrated expertise to the bedside.[1]

In this issue of the *International Journal of Cardiovascular Sciences*, Salvadori et al. report a prospective, single-center, five-year evaluation of a rapid response team program in a quaternary Brazilian hospital.[2] Over the study period, the team attended 4,805 emergencies, consisting of 551 cardiac arrests and 4,254 non-arrest deteriorations. Survival among patients with non-arrest emergencies improved significantly (from 57.1% to 64.5%; $p = 0.003$), whereas survival after cardiac arrest remained low and unchanged. The study has several strengths: it is a large, real-world, prospective analysis that captures process-of-care metrics beyond outcomes, such as time to epinephrine, time to first shock, and time to advanced airway. This level of granularity in the data is crucial in the care of critically ill patients. Outcomes may be unfavorable despite coordinated, appropriate care because of underlying severity, and conversely, occasional survival may occur despite suboptimal response. Measuring processes in detail allows teams to distinguish signal from noise and thereby improve performance over time.

However, several limitations warrant discussion, many of which are acknowledged by the authors.[2] Firstly, the absence of pre-implementation baseline data precludes a formal before-and-after analysis. Secondly, activation of the rapid response teams for acute deterioration without cardiac arrest ("code yellow") was optional, introducing potential underrecognition and selection bias, likely enriching for sicker patients. In addition, only about 10% of cardiac arrest cases presented with a shockable rhythm. The remaining 90% presented with a non-shockable rhythm, which is typically associated with non-cardiac etiologies and less favorable prognosis. This may reflect delayed recognition of deterioration on the wards. Together, these factors could attenuate any observable benefit on arrest survival while still permitting meaningful improvements in non-arrest outcomes.

Contemporary guidelines from the American Heart Association and the European Resuscitation Council emphasize that hospitals should field teams capable of delivering advanced life support within tight time targets and should continuously track performance against predefined metrics.[3-5] Guidelines highlight the need for early recognition of patients at risk of cardiac arrest, which is the first link in the chain of survival. The logic is straightforward: prevent the arrest rather than attempt to rescue from it. When deterioration is recognized early and a skilled team arrives quickly, ischemia, malignant arrhythmias, and hemodynamic collapse can often be averted. This is the practical bridge between quality improvement and resuscitation science: measurement yields data; data drives accountability; accountability changes practice.[3-5] Early recognition, in conjunction with an action-oriented approach, has proved crucial in improving outcomes in out-of-hospital cardiac arrest, such as in sports settings.[6]

Evidence from multiple publications supports this prevention-first paradigm. A systematic review concluded that there exists a consistent signal that medical emergency teams reduce in-hospital cardiac arrests and, in some contexts, all-cause mortality.[7] Experience from Australia has demonstrated that the implementation of rapid response teams is associated with lower hospital mortality compared with traditional code-based care, suggesting that the primary benefit lies in preventing arrests rather than improving the poor odds once an arrest occurs.[8] Further meta-analyses indicate fewer arrests outside the intensive care unit and a context-dependent effect on mortality, with heterogeneity driven by activation thresholds, response times, and program maturity.[9-11] While structured rapid-response models outperform traditional code teams on process-of-care metrics, those metrics are influenced by factors such as event timing, team response interval, time to defibrillation and airway management, and telemedicine

Keywords

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availability. When optimized, these gains translate into improved outcomes in selected populations.[12] Taken together, three pragmatic concepts emerge for optimizing rapid response teams: (i) the earlier the activation, the fewer the arrests; (ii) the faster the response, the greater the likelihood in improving outcomes; and (iii) the more rigorous the measurement, the more the system can be continuously improved. Furthermore, certain clinical conditions, such as acute infectious diseases,[13,14] may be associated with a higher risk of cardiovascular events or sudden death. Highlighting these underrecognized risks encourages tighter monitoring for vulnerable patients and the implementation of broader surveillance programs.

Finally, artificial intelligence offers a realistic path to sharpen inpatient risk stratification for sudden cardiac death. Beyond static scores, artificial intelligence can integrate continuous vital-sign measurements, laboratory trajectories (e.g., potassium, creatinine, troponin, NT-proBNP), medication exposures (QT-prolonging agents), imaging, and semi-automated electrocardiographic interpretation, including continuous ECG monitoring.[15,16] Such multimodal models can improve short-horizon prediction of cardiac arrest and generate actionable alerts in life-threatening scenarios such as hypoxemia, hypotension, electrolyte imbalance, dynamic ST-segment shifts; thereby prioritizing early interventions (electrolyte repletion, anti-ischemic therapy, escalation of monitoring, rapid intensive care unit transfer) and reducing arrest occurrence. Continuous telemetry and artificial intelligence-assisted ECG analysis also extend detection to silent ischemia and repolarization patterns that precede malignant arrhythmias.[15,16] It is reasonable to expect that these strategies will become increasingly available in daily practice, further reinforcing rapid response teams' performance.

As the adage goes, "the road is made by walking." Although the study by Salvadori et al. did not demonstrate improved survival after in-hospital cardiac arrest, it provides a valuable impetus for future work. We can only improve what we measure. If we track what matters (time to rapid response team activation, time to treatment, and arrest incidence), we can improve what matters most: preventing avoidable cardiac arrests and reducing preventable morbidity and mortality. As in other contemporary medical fields, these data emphasize where rapid response teams deliver their greatest value: preventing arrests rather than attempting rescue from them.

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Erratum

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