

Implementation of the rapid response system in the acute care ecosystem

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We want our patients to get well and return to their pre-illness lives. However, the grim reality is that 3%–9% of patients in hospital experience clinical deterioration during their stay. A transition from one clinical state to one that is worse increases their risk of morbidity or death.⁽¹⁾

Survival rates after hospital cardiac arrests are poor, with a one-year survival of about 13.4% according to Schlupep et al.⁽²⁾ However, up to 80% of cardiopulmonary arrests are preceded by periods of physiological instability.^(3–5) When recognised and acted on appropriately, such antecedent events are windows of opportunity whereby timeous and appropriate interventions, perhaps in the form of a rapid response system (RRS) crisis call, could alter the trajectory and spiral of deterioration. RRS functions through an afferent, ‘crisis detection’ and ‘response triggering’ mechanism that actuates its purposes through an efferent, prearranged rapid response team (RRT). The system is complemented and supported by a governance/administrative structure that organises and supplies resources, and also has audit and evaluating functions.⁽⁶⁾ This concept was first introduced at the first International Conference on Medical Emergency Teams in 2005.

In the event of a crisis call, multidisciplinary teams or RRTs, which usually comprise a group of clinicians (i.e. physicians, nurses and respiratory therapists), attend to such crisis events to support frontline healthcare staff in the management of these acutely deteriorating patients.⁽⁷⁾ Two recent meta-analyses have highlighted the statistically significant reduction of in-hospital cardiac arrests and hospital mortality after the implementation of RRS.^(8,9) The use of scarce intensive care unit (ICU) resources can be suitably triaged and appropriately deployed,⁽¹⁰⁾ resulting in reduced incidences of postoperative adverse outcomes/mortality, as well as reducing the mean duration of hospital stays.⁽¹¹⁾

The effectiveness of RRS in reducing hospital mortality is supported by an early landmark randomised controlled trial conducted by Priestley et al in 2004.⁽¹²⁾ Over the years, various studies also provided sound evidence of clinical outcome improvement after the implementation of RRS.^(13,14) However, some studies proved otherwise.^(15,16) In particular, two major randomised trials involving RRS – the MERIT (Medical Early Response, Intervention and Therapy) trial⁽¹⁷⁾ and the EPOCH trial on the effect of a paediatric early warning system on all-cause mortality in hospitalised paediatric patients⁽¹⁸⁾ (with important limitations) – failed to demonstrate benefits based on the endpoints of death, unexpected cardiac arrests and unplanned ICU admissions.

Variations in the efferent or action/response limb of the RRS also affect its effectiveness. Further research is required to identify the configuration and composition of RRS team members that give the best fit and which trigger system⁽¹⁹⁾ is most appropriate. Aggregate-weighted multi-component early warning scores such as the Modified Early Warning Score, a simple physiological scoring tool that aids communication between nursing and medical staff about deteriorating patient conditions, are used by the early response team in decision-making. Although helpful in identifying early deterioration, the Modified Early Warning Score has been shown to have limitations in discriminatory performance and generalisability.⁽²⁰⁾ It was also noted to have lower sensitivity and specificity in certain populations.⁽²¹⁾

One of the most widely used outcomes in assessing the clinical effects of an RRS is the volume of unplanned ICU admissions from general wards. A decrease in unplanned ICU admissions reflects recognition and early treatment of at-risk patients in general wards. Studies, including the COMET pragmatic study,^(22,23) demonstrated a significant reduction in unplanned ICU admissions after the introduction of an RRS. While a Dutch study⁽²⁴⁾ reported an increase in unplanned ICU admissions, Sakai and Devita⁽⁷⁾ refuted this concern, opining that an increased number of admissions to the ICU does not necessarily translate to an increase in ICU days. On the contrary, earlier detection and prompt treatment of critically ill patients may reduce the number of days that each patient spends in the ICU.

While the RRS is designed to recognise and respond to clinically deteriorating patients, overly sensitive criteria for activating the RRS may result in excessive activation of the team, causing system fatigue with questionable tangible benefits.⁽⁸⁾ Conversely, non-activation and delays in activation may cause harm.⁽²⁵⁾ Cultural barriers in the clinical environment,⁽⁷⁾ unclear roles between the primary and response team,⁽²⁶⁾ and a lack of standardisation of trigger thresholds for activation⁽²⁶⁾ have contributed to under-utilisation of the RRS. DeVita et al⁽²⁷⁾ and Foraida et al⁽²⁸⁾ have argued that this problem may be ameliorated by having clearly defined and objective criteria for initiating a crisis activation, as well as disseminating and publicising these among healthcare staff. Alternatively, having mandatory activation of RRS when criteria are met, rather than voluntary activation, has been described.⁽²⁹⁾ Importantly, when there is a delay in activating appropriate crisis calls, feedback must be given to those involved, in the spirit of education and quality assurance.

Some have advocated for patient- and family-initiated escalation schemes. These can arguably act as a safety

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mechanism through better and quicker identification of patient deterioration.⁽³⁰⁾ However, differing cultures and contexts may affect its transferability and therefore, widespread adoption.

Another concern faced in the implementation of RRS, according to a study by Liaw et al, is reliance on the RRT, which can potentially lead to deskilling of ward staff in acute care and treating medical crises.⁽²⁶⁾ In practice, RRS members would expect the participation of the ward staff when they respond to activations. This presents opportunities for point-of-care teaching and has resulted in improved confidence in managing decompensating patients.⁽³¹⁾ Moreover, staff are expected to maintain competency in managing acute deterioration, even with the availability of RRS. This is not unlike the expectation and requirement that all hospital staff demonstrate competency and maintain expertise in Basic and Advanced Cardiac Life Support through regular refresher courses, for the occasion, however rare, when these skills are needed.

Regardless of the arguments and verdict, the value RRS adds to patient well-being has received objective affirmation and vindication, with the United States' Institute for Healthcare Improvement advocating for its deployment.⁽³²⁾ Moreover, the Joint Commission⁽³³⁾ and the American Heart Association⁽³⁴⁾ have mandated and recommended the use of RRS in American hospitals and general care wards, respectively.

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There was little information regarding RRS in Singapore before Liaw et al's study,⁽²⁶⁾ which cleverly used an instrumental case study approach⁽³⁵⁾ in their exploration of RRS in local acute public sector hospitals. By using a mixed methodology and employing a structured interview, the authors provided thick descriptors to portray the complexities of their study topic. This attempt at a national study allowed comparison across the participating hospitals. Significantly, the study demonstrated a lack of uniformity with regard to how these hospitals deployed RRS and its variants in moments of need. This reflected the absence of a local 'best fit' system appropriate to the local context, thereby indicating the need for national standardisation to streamline and improve the performance of the RRS. One could perhaps start by unifying the various track and trigger systems currently in use (single- or multiple-parameter systems, aggregate scores or combined system). What could be even more helpful is triangulating their findings with opinions from RRS 'users and doers' for a thorough, interpretivist real-world view of this topic.

Finally, in the spirit of action research,⁽³⁶⁾ Liaw et al⁽²⁶⁾ could work with the recently formed RRS chapter of the Society of Intensive Care Medicine (Singapore)⁽³⁷⁾ as well as other bodies such as the Ministry of Health and local universities⁽³⁸⁾ to advocate for a national standardised RRS model that is fit for purpose, so that it can become an integral part of the acute care ecosystem.

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