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What's new with rapid response systems?

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Introduction

The term rapid response system (RRS) describes a hospital-wide approach to (a) improve the detection of deteriorating patients and (b) provide a responding team who commence treatment aimed at preventing serious adverse events including cardiac arrest and unexpected death [1]. Ward staff are alerted to clinical deterioration when patients fulfil predefined criteria based on vital sign derangement and other important changes in the patient's clinical status (Table 1).

Rapid response team (RRT) staff have the required skills and knowledge to assess and manage critically ill patients. As such, they are often based in the intensive care unit (ICU). An essential underlying tenant of the

Table 1 Example of rapid response team activation criteria

Airway

- Obstructed airway
- Noisy breathing or stridor
- Problem with a tracheostomy tube

Breathing

- Any difficulty breathing
- RR < 8 breaths/min
- RR > 25 breaths/min
- SpO₂ < 90 % despite 10 L oxygen

Circulation

- HR < 40 bpm
- HR > 120 bpm
- SBP < 90 mmHg
- UO < 50 mL over 4 h

Conscious state

- Sudden change in conscious state
- Patient cannot be roused
- Prolonged or uncontrolled seizures

Other

- Severe or uncontrolled pain
- Severe bleeding (>100 mL/h)
- You are worried about the patient for any other reason

RRS model is that early intervention in the course of deterioration improves patient outcome [1].

Improving detection of deterioration

Research in the era prior to RRS implementation suggested that hospital wards may not reliably detect and/or recognise clinical deterioration [1]. Escalation of care was not always timely or commensurate, sometimes resulting in suboptimal patient management, unplanned ICU admissions, cardiac arrests, or unexpected deaths [1]. To assist ward staff with decision support at the point of patient care, single parameter triggers (Table 1) and modified early warning scores (MEWS) have been developed. Both are effective in improving response triggering rates.

Implementation of automated scoring systems may be associated with reductions in the risk of in-patient death [2]. Such systems calculate an aggregate MEWS, overcoming errors in manual summation of the individual score components. In addition, many provide guidance about the expected response to the MEWS based on the local hospital escalation protocol.

Acquisition of vital signs may be improved with the use of continuous electronic monitoring systems, and there is some evidence that their implementation is associated with cost savings [3]. However, such benefits may be offset by frequent false positive alarms resulting in workflow disruptions and alarm fatigue [4]. Strategies to optimise use of continuous monitoring systems in non-critical care areas are needed. In addition, laboratory results may provide a “biochemical trigger” that predicts increased risk of unplanned ICU admission and in-patient death [5].

Emerging professions: rapid response team and outreach nurses

With the promulgation and maturation of the RRS model there is an accumulating expertise amongst the team members of the RRT. In jurisdictions where nurses are RRT team leaders and/or autonomous practitioners in critical care outreach services, they are increasingly identifying themselves as “RRT nurses”, “critical care outreach nurses” [6] or “intensive care liaison nurses” [7]. It is likely that such roles will receive more formal recognition as nursing subspecialties in the future, along with the development of formal training programs.

Formation of the International Society for Rapid Response Systems

In May 2014 the International Society for Rapid Response Systems (iSRRS) was formed [8]. The society aims to promote the highest standard of knowledge to recognise and prevent acute deterioration of hospitalised patients. This will be achieved by liaison with other learned bodies and societies, organisation of the annual international RRS conference, and the development and promulgation of textbooks, research articles, guidelines and training material related to deteriorating patients, RRSs and RRTs.

Rapid growth in research

With RRS dissemination, there has been a steady increase in research publications related to all elements of this model of care. This includes validation of calling criteria, stratification of patients at risk of clinical deterioration, assessment of the benefits of different types of monitoring and decision support, exploration of optimal team composition, and individual team member roles.

In addition, there is interest in the characteristics and outcomes of patients reviewed by the RRT [9] and the interventions performed during the call. An important finding is that patients in acute hospitals at the end of life are often not recognised, and that at least one-third of RRT calls occur in patients with limitations of medical therapy and end of life care issues [9]. In addition, in approximately one-quarter of RRT calls the patient requires ICU admission, and one-tenth will require non-invasive ventilation. Moreover, approximately one-quarter of patients who receive an RRT call will die during the same hospital admission, and this risk is higher in patients who receive repeat RRT calls, or those with end of life care issues [9].

Importantly, the implementation of an RRS has been associated with improvements in patient outcomes—most consistently, a reduction in the incidence of cardiac arrests occurring in patients in non-critical care areas [10, 11].

Resource considerations

Similar to the implementation of any system aimed at improving the care of the seriously ill (including ICUs), the RRS needs to be appropriately resourced [12]. Otherwise, adverse events may occur in ICU patients while critical care staff are on RRT calls [13].

Importantly, cost savings associated with preventing unplanned ICU admissions may in itself justify the funding of a hospital-wide RRS [14].

and cardiogenic pulmonary oedema, to minimise undesirable practice variation in the management of such conditions [15].

Improved understanding of the epidemiology of patient deterioration

Just as research into cardiac arrests provided evidence for the potentially avoidable nature of these events [1], research into the nature and outcomes of RRT patients has also provided insights into factors contributing to patient deterioration [15]. Thus, further improvements in outcomes of at-risk and deteriorating hospitalised patients may be achieved through reducing delays in RRT activation; improved advance care planning and end of life care; as well as by reducing delays in transfer to critical care areas. It may also be possible to standardise the care of commonly encountered RRT conditions such as sepsis

Areas of future research

Ensuring that the management of seriously ill patients is achieved in a timely manner by experienced staff is intuitively obvious, whether on the general wards or in an ICU. It is unlikely that further randomised controlled trials testing this assumption will occur for RRSs. Future research initiatives will focus on areas such as optimal team composition; sensitivity and specificity of calling criteria; optimal methods for monitoring in general wards; curricula for RRT training, the best way to train RRT members, and the cost-benefit analysis for RRSs. Finally, the applicability of this model of care in developing countries will probably be examined in the future.

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