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## **Re-thinking the problem of clinically deteriorating patients: time for theory-informed solutions.**

It is over 20 years since McQuillan et al [1] reported deficiencies in clinical care that in-patients on hospital wards received before being transferred to an Intensive Care Unit (ICU). In more than half of cases, there was poor recognition of changes to vital signs and delays in contacting a more senior clinician resulting in increased patient mortality, morbidity, and resource consumption in the ICU [1]. These results have been echoed in multiple studies across the world since that time. Common across this work is the vulnerability of hospitalised patients who clinically deteriorate without appropriate recognition and intervention and the urgent need for a system-wide approach to strengthen care in this area and ensure patient safety. Rapid Response Systems (RRS) have since been theorised as including afferent (recognition) and efferent (response) limbs [2] and operationalised in various forms in acute hospitals internationally.

More than half of the patients who clinically deteriorate to the point of requiring resuscitative interventions have preceding changes in physiology that could be identified through accurate monitoring of vital signs. Consequently, the monitoring, recording, and interpretation of vital signs (behaviours typically enacted by nursing staff [3]) are central to afferent limb of the RRS. Given the predictive value of vital signs in identifying clinical deterioration, there is an expansive body of literature dedicated to the development and content validation of track-and-trigger tools [4, 5] that signal to healthcare staff when a patient's vital signs have breached specified criteria and prompt them to act. Although the variable track-and-trigger tools prompt different behaviours, the main actions are increasing the frequency of vital signs measurements and contacting another clinician within the care team (broadly termed escalation of care).

Escalation of care might be at different levels or tiers based on the severity of the patient's physiological abnormalities with mild physiological abnormalities triggering review by registered nurses and/or doctors (termed a pre-MET, urgent clinical, or multi-disciplinary review) and more severe abnormalities prompting activation of a dedicated response team (e.g., a Medical Emergency, Rapid Response or Critical Care Outreach Team) [6, 7]. Findings from several systematic reviews suggest that patient outcomes are improved when a response team is activated; that is, when the efferent limb of the RRS is activated [8–10]. However, benefit to patients from having the response team involved in their care is contingent on ward-based clinical staff enacting more proximal (afferent limb) behaviours

Word count = 1465

within the clinical workflow in the right way and at an appropriate time, and on there being adequate rapid response personnel to respond.

Despite international implementation of RRSs and track-and-trigger tools, there is evidence of ongoing inconsistencies in the care that clinically deteriorating patients receive. From two recent Australian studies with observational designs published in this issue of *Australian Critical Care*, it was reported that calling criteria were breached in more than a quarter of patients who clinically deteriorated to the point of cardiac arrest or unplanned ICU admission, but no Medical Emergency Team activation occurred [11, 12]. These findings highlight the need to further optimise the RRS and to facilitate desired behaviours from those operating within the system.

There is an expansive body of literature reporting barriers and/or facilitators that determine the behaviour of ward-based clinical staff when they are enacting behaviours of the afferent limb. Results of a recent multi-site survey published in this issue indicated that clinical staff from a range of professional disciplines faced barriers in one third of conversations where the intent was to escalate care for a clinically deteriorating patient [13] suggesting that staff experience these challenges with moderate frequency. Traditionally, interventions to ameliorate barriers to patient monitoring and escalation of care have tended to be educational and have focused on deficits in knowledge and/or skills. Systematic review findings suggest whilst education for clinical staff may improve confidence and immediate performance in recognising and responding to clinically deteriorating patients, it rarely results in sustained behaviour change or favourable patient outcomes [14, 15]. The lack of sustained impact from educational approaches may be explained by literature from the Implementation Science community who have argued that whilst knowledge is a pre-requisite to the decisions individuals make and the subsequent behaviours they enact, possession of accurate information is not independently associated with behaviour change [16, 17]. Despite less than convincing evidence for education-only approaches, recommendations for further staff training remain common in clinical practice and in publications focusing on optimising care of clinically deteriorating patients. This may reflect the pragmatic appeal and relatively quick and inexpensive nature of designing and delivering education, versus more complex and resource intensive approaches to intervention design.

In two recently published empirical studies from the UK [18] and Australia [19] a theoretical determinants framework was used to explore barriers and facilitators to clinical staff enacting afferent limb behaviours. Whilst barriers related to knowledge and skills were identified, broader individual and situational determinants were also evident including

numerous barriers related to the physical environment and social context [18, 19]. This work highlights the potential challenges we face in optimising care for clinically deteriorating patients and implies that whilst there may be an ongoing role for education, it should not be considered a panacea to this complex and pervasive problem. Moving forward there is a need to think more systematically, expansively, and creatively in our endeavours to develop solutions to avoid the pitfall of seeking a simple and non-scientific answer to address a complex problem [20].

There is evidence that the number of rapid response team activations are increasing in Australasia [21]. Given that resources are often finite, this could create an unsustainable situation for individual responders and teams responsible for operationalising the efferent limb of the RRS [22]. On this basis, the author of a recent editorial from this journal has advocated for greater focus on the ward-level response to signs of clinical deterioration that precede activation of a response team, i.e. pre-MET activity [23]. From a single-centre retrospective cohort study it was reported that almost 1 in 5 hospital admissions results in a pre-MET activation [24]. Timely pre-MET activation and subsequent patient assessment could permit ward-based clinical staff to identify those patients at greatest risk of continual deterioration and to make timely referrals to critical care [24]. Appropriate use of the pre-MET tier could also enable the identification of patients for whom invasive critical care interventions are not appropriate earlier in the deterioration trajectory and provide an opportunity for proactive end of life planning [11]. Strengthening and/or re-designing the RRS with further emphasis on the ward-level response may increase workload of ward-based clinical staff and further research is needed to better understand these implications [24]. In mature RRSs where a tiered response is already in place, there may also be opportunities to explore empirically how high-functioning ward teams remain resilient and adaptive when experiencing a high frequency of pre-MET (or equivalent) and use this information to support behaviour change in other areas.

The nursing contribution to the RRS has typically been characterised as monitoring vital signs and escalating care by activating an appropriate response. This is reflected by results from documentary analyses of guidelines and policies directing care of clinically deteriorating patients from the UK [7] and Australia [6]. Findings from empirical studies suggest there may be considerable misalignment between what is described in these documents and what occurs in clinical practice. From a mixed-methods Australian study it was found that some nurses perceive themselves as initial responders when a patient in their care deteriorates, and alongside conducting further assessment attempt a range of interventions within their scope of practice to stabilise the patient whilst awaiting a response

[25]. These findings are broadly consistent with those of an interview study conducted in the UK where nurses described attempting to stabilise a patient whose vital signs were abnormal by obtaining samples for blood gas analysis, re-positioning the patient, and/or administering supplemental oxygen or prescribed medications such as nebulised bronchodilators or intravenous fluids [18]. Collectively, this work indicates that some nurses take a far more active role in the continuum of care that extends from activating a response to providing clinical interventions. Competing priorities and the need to provide care to other patients is a barrier to nurses providing interventions after escalating care [18, 25]. However, it is also plausible that the 'invisibility' of this work from guidelines and policies may also explain why these behaviours are enacted inconsistently. More accurate acknowledgement of the role of nurses would permit the development of policies that are more reflective of clinical practice, legitimise the contribution of nurses beyond simply being the activators of a response, and shape multi-disciplinary educational curricula to ensure nurses and other clinical staff have the required knowledge and skills in this area. The studies reported in this issue of *Australian Critical Care* help progress this issue, but further development is urgently required.

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