EDITORIAL

Early warning score to detect deterioration in the hospital: role of staffing and alarm fatigue?

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Patients who experience severe adverse events such as cardiopulmonary arrest, unplanned intensive care unit (ICU) admissions and death during their hospital stay show signs of deterioration up to 24 hours prior to the event.[1] Direct and adequate intervention is needed when a deteriorating patient is identified. To provide this early treatment, the rapid response system (RRS) was introduced.

The most recent systematic review on this subject concluded that RRSs reduce hospital mortality and non-ICU cardiopulmonary arrests.[2] Implementation of an RRS also significantly reduced the number of cardiopulmonary arrests, unplanned ICU admissions and mortality in patients admitted to in-hospital wards in the Netherlands.[3] As RRSs reduce the number of severe adverse events, it has been mandatory for every hospital in the Netherlands to have a functional RRS since 2008.

The two primary components of a functional RRS are the afferent and efferent limbs. The afferent limb involves the early detection of the deteriorating patient by nurses with the use of an early warning score; the Modified Early Warning Score (MEWS) is used in the Netherlands. Above a certain threshold of abnormal vital signs (for example a MEWS >3), the efferent limb is activated whereby the ward doctor or supervisor is consulted and when necessary the rapid response team (RRT) consisting of healthcare providers trained in early resuscitation interventions and advanced life support is called upon to promptly respond to the situation.

Limiting factors of this system are inadequate recognition of deterioration or delayed activation of the RRT.[4] One of the main reasons for missing deterioration or delayed activation is a very high workload. A high patient-to-nurse ratio is associated with increased mortality and delayed activation of the RRT.[5]

In addition, during shifts with a significantly higher patient-to-nurse ratio (i.e. weekends and overnight) the number of RRT calls is significantly lower compared with day shifts.[6] This decrease may potentially be reduced by proactive nurse surveillance and automated RRT activation.[7]

The study by Ludikhuize et al., presented in this issue of the Journal, is important as it confirms that there is a significantly higher patient-to-nurse ratio during out-of-hours shifts and during these shifts there is a significant reduction in RRT calls (up to 50%) in Dutch hospitals.[8] Despite a high self-reported compliance to the RRS protocol, which is one of main limitations of their questionnaire-based study, the actual adherence is reported to be low.[4] The combination of these factors may suggest that during out-of-hours shifts, deterioration of patients is likely to be missed and activation of the RRT may therefore be delayed. This is in concordance with prior research which shows that as nurse staffing levels increase, patient risk of complications and hospital length of stay decreases.[8]

We therefore agree with Ludikhuize et al. that future studies should focus on improving timely activation of the RRT and to investigate whether reduced RRT activation during the night and weekends is actually related to worse patient outcome. However, the factors related to alarm fatigue also should be taken into account. Although the negative predictive value of MEWS is high for a low score, the positive predictive value of a positive MEWS (>3) can be as low as 14%.[9] Therefore, more effort should be undertaken to increase the specificity and the positive predictive value of the MEWS. Use of artificial intelligence to increase the specificity and automated activation of rapid response teams may be of help and should be more intensively studied to test the feasibility and applicability in Dutch hospitals.

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