ICU MANAGEMENT & PRACTICE

ICU Volume 6 - Issue 4 - Winter 2006/2007 - Matrix Features

Taking the Next Step in Medical Emergency Team Management

Authors

Michael R. Pinsky, *MD, Dr hc*

Michael A. DeVita, *MD*

Department of Critical Care Medicine

University of Pittsburgh,Pittsburgh, USA

pinskymr@upmc.edu

Medical emergency teams responding to bedside caregiver-activated calls, triggered by deterioration in defined, continuously measured physiological variables, reduce mortality, morbidity and the cost of healthcare. However, to become universally effective, they need to develop an automated, integrated and universal monitoring system that does not require bedside caregiver input for initiation.

Medical emergency teams (METs) are part of a hospital's rapid response system (RRS), a programto identify and respond to suddenly critically ill patients and to prevent future events. The teams (the responder component of the system) respond to bedside caregiver- activated calls, which are triggered by patient deterioration. While this deterioration is often discovered in the course of routine patient care or a patient call for a nurse, it may also be identified through continuously measured physiological variables.

When activated, METs have been shown to reduce mortality, morbidity and healthcare costs (Bellomo et al. 2003; Buist et al. 2002; DeVita et al. 2004; Tibbals et al. 2005). Implementation of the MET in these studies decreased the risk for patients to have an adverse outcome by 58% ($p< 0.0001$) and reduced the duration of stay after major surgery ($p=00092$). Table 1 shows some of the results of the introduction of the MET.

Once initiated, RRS by MET services have been found to be cost-effective, because they reduce length of stay and mortality and prevent ICU admissions (Garcea et al. 2004; Bellomo et al. 2004). However, RRS effectiveness may be limited by the need to have caregiver direct observation of patient behavior in order to identify factors associated with instability in the patient's condition.

Both Jones and Galhotra have reported an unexpected diurnal variation in MET activation that relates more to staffing than patient illness and may be mitigated by increased monitoring (Galhotra et al. 2006; Jones et al. 2006). These authors have opined that, for RRS to become most effective, hospitals need to develop an automated, integrated and universal monitoring system that permits bedside caregiver interface, but does not require bedside caregiver input to trigger a MET response. Continuous monitoring systems, like pulse oximetry, allowfor independent patient monitoring, but account for only a limited number of physiologic variables. Additionally, monitoring artifacts are often associated with probe dislodgement and low signal-to-noise ratio, such as erratic signals and unphysiologically lowO_2 saturation signals from probe dislodgement, (Tsein and Fackler 1997). The systems have no capability to cross-reference other vital signs to "weed out" false alarms. Because only about 50% of crisis events are hypoxemic respiratory events (with most of the remainder being neurologic or hemodynamic deterioration), multiple physiologic variables must be monitored to accurately identify patients in crisis.

Systems that can synthesize and integrate data from a number of physiologic sources may more effectively target patients at risk. Subbe et al. (2001) implemented an Early Warning Score (EWS) to provide for more objective evaluation and synthesis of physiologic measures to identify patients at risk for deterioration. In a prospective study, they categorized data from 5 parameters (blood pressure, heart rate, respiratory rate, temperature and level of consciousness, each scored 0 to 3 (0 being normal), the total giving EWS. Table 2 on page 14 shows the results of this study, based on a cohort of 709 medical ICU patients.

Implementing the EWS system can identify unstable patients earlier (Sharpley et al. 2004). However, current non-automated systems still require direct and intermittent collection of data by clinicians, as well as intermittent calculation and reference to norms, thereby limiting their utility. Undetected deterioration may occur between assessments.

What is needed to make the MET advance to the next level of care effectiveness is a sufficiently robust and sensitive continuous monitoring system that would work on all hospitalized patients. Data gathered continuously and analyzed by automated algorithms could then be used to

activate the MET. Hopefully, the continuous data sampling and cross-referencing between parameters would provide both greater sensitivity and specificity. An “intelligent” monitoring device is likely to prevent adverse events by triggering more reliable, earlier activation of the MET. Overcoming the hurdle of “getting the team to the right spot and the right time” is likely to help reduce clinical harmand facilitate matching patients’ severity of illness to the right care setting.

Published on : Thu, 15 Aug 2013