

# Vitalness of vital signs, and medical emergency teams

D James Cooper and Michael D Buist

*Patients' simple vital signs are a highly reliable predictor of life-threatening clinical events*

At a time when hospital staff are becoming increasingly dependent on new technologies, the review by Cretikos et al (page 657)<sup>1</sup> entitled "Respiratory rate: the neglected vital sign" is refreshing. It is a timely reminder that understanding, documenting and acting on changes in patients' simple vital signs are of fundamental importance to clinical outcomes.

An abnormal respiratory rate (high or low) is known to be a highly reliable predictor of life-threatening clinical events. However, daily documentation of this simple number in many hospitals is remarkably poor.

More controversial is the question of how best to develop systems that use changes in vital signs to trigger clinicians to respond rapidly and effectively. In recent years, many Australian hospitals have embraced medical emergency teams (METs) as the answer.<sup>2</sup> METs enable rapid, skilled medical responses to changes in patients' vital signs, aiming to intervene and reverse patients' downhill slides towards intensive care unit (ICU) admission, cardiac arrest, or death. Call criteria for the MET (changes in respiratory rate, pulse rate, blood pressure, and coma score) have been carefully researched and are highly predictive of adverse events. METs are resource-intensive and are usually comprised of an intensive care registrar, a medical registrar and skilled nursing staff. They provide resuscitation skills at short notice in busy hospitals, where the primary medical teams may be busy, inexperienced, under-resourced or slow to respond.

Australian studies based on single centres with historical controls,<sup>3,4</sup> and on a single-centre before-and-after study,<sup>5</sup> have reported that the introduction of METs was associated with reductions in key adverse events. Although before-and-after studies cannot separate the effect of an intervention from other factors that may have changed over time, studies like these were used to justify the enthusiasm and funding needed for the Medical Early Response Intervention and Therapy (MERIT) study investigators, with the Australian and New Zealand Intensive Care Society's Clinical Trials Group, to conduct the world's first large multicentre randomised controlled trial of MET introduction versus usual care.<sup>6</sup> In clinical trial terms, the results of the MERIT study were clearly negative. There was no difference between intervention and control hospitals for either a composite endpoint (incorporating cardiac arrest, unexpected death or unexpected ICU admission) or for the same key study outcomes analysed separately. Adverse events decreased in *both* the intervention and control hospitals during the study period (as they had also done in the previous single-centre studies<sup>3-5</sup>), suggesting that factors other than the introduction of METs were improving key endpoints in both intervention and control hospitals during the study period.

The MERIT study also found that introducing METs markedly increased the number of calls to hospital emergency teams and increased the early designation of suitable patients with "do not resuscitate" (DNR) orders. Total hospital deaths (unexpected plus expected [DNR] deaths) were marginally higher in MET hospitals than in non-MET hospitals during the study period.

The MERIT study was remarkable in that it involved 23 Australian hospitals and over 36 000 patients, used a vigorous education process, and changed established systems in 12 hospitals.<sup>6</sup> In order to account for its negative findings, the study has been criticised for inadequate power, for inadequate calling of the MET in the MET centres, and for a Hawthorn effect likely in the unblinded study design. It has also been said that changes after MET introduction may take longer to mature than was allowed for in the study design. These criticisms have validity, but it is also highly likely that the results of the unique MERIT trial were essentially correct. METs do not provide a single solution to the complex problem of clinician management of clinical instability in hospital patients. However, they do enhance appropriate designation of patients with resuscitation status, and they do encourage education, documentation and attention to patients' key vital signs. Supporting this view is the recent experience of a hospital in Victoria that has focused, for the past 10 years, on using the MET system to improve management of clinically unstable ward patients.<sup>7</sup> Cardiac arrest rates fell before and after the introduction of a formal and informal education process *and* a MET in this hospital, but then continued to decrease annually for each of the following 5 years (to extremely low rates). This was despite the fact that the MET was unchanged over the 10-year period. It appeared that the most important parts of a MET system are not the MET at all, but rather the audit, educational programs and DNR designations associated with it.

The article by Cretikos et al and the MERIT trial results inform us that understanding, education, documentation, rapid clinical response to abnormal vital signs, and early designation of patients with an appropriate resuscitation status really do matter. To improve our hospitals we need mechanisms for simple, real-time communication of abnormal vital signs to hospital clinicians, so that timely management can occur across all acute hospital beds. Communication systems that do this, and also report, audit, and provide staff education and training, exist now, and may enable improved clinical management of unstable in-hospital patients.

METs are a simplistic "bandaid" response to a complex problem in our hospitals. They are not the best response. Instead we need better education, focused on those critical vital signs. We need earlier appropriate DNR designation, and we need to test real-time emergency information systems. The evidence is that patient outcomes can be improved.

## Competing interests

Michael Buist is a director and shareholder of Patientrack (MKM Consulting, Canberra), an electronic system for monitoring patients' vital signs and issuing alerts to appropriate clinicians.

## Author details

D James Cooper, MD, FRACP, FJFICM, Deputy Director and Head of ICU Research<sup>1</sup>

## EDITORIALS

**Michael D Buist**, MD, FRACP, FJFICM, Director of Intensive Care and General Physician,<sup>2</sup> and Professor<sup>3</sup>

1 Intensive Care Department, The Alfred Hospital, Melbourne, VIC.

2 Dandenong Hospital, Melbourne, VIC.

3 Department of Intensive Care and Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, VIC.

**Correspondence:** j.cooper@alfred.org.au

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