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Clinical paper

Point prevalence of patients fulfilling MET criteria in ten MET equipped hospitals. The methodology of the RESCUE study☆

Tracey K. Bucknall[a,b,*], Daryl Jones[c,d], Jonathon Barrett[a], Rinaldo Bellomo[c], Mari Botti[b,e], Julie Considine[b,f], Judy Currey[b,g], Trisha L. Dunning[b,h], David Green[h], Michele Levinson[a,d], Patricia M. Livingston[b,i], Bev O'Connell[b,j], Rasa Ruseckaite[a,b], Margaret Staples[a,d]

[a] *Cabrini Health, Australia*
[b] *Deakin University, Australia*
[c] *Austin Health, Australia*
[d] *Monash University, Australia*
[e] *Epworth Health Care, Australia*
[f] *The Northern Hospital, Australia*
[g] *Alfred Hospital, Australia*
[h] *Barwon Health, Australia*
[i] *Eastern Health, Australia*
[j] *Southern Health, Australia*

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ABSTRACT

Objective: The RESCUE study examined the prevalence of patients at risk of a medical emergency in acute care settings by assessing the prevalence of cases where patients fulfil the hospital-specific criteria for MET activation. This article will detail the study methodology including the ethics applications and approvals process, organisational preparation, research staff training, tools for data collection, as well as barriers encountered during the conduct of the study.
Design and Setting: A point prevalence design conducted at 10 hospitals, comprising of private and public, secondary and tertiary referral, ICU equipped, metropolitan and regional settings.
Patients: All inpatients were eligible except intensive care and psychiatric patients.
Measurement and main results: On a single day consenting inpatients in each hospital had a single set of vital signs obtained, their observation chart reviewed and followed up for MET activations, unplanned ICU admissions, cardiac arrests and 30 and 60 day mortality. Of 2199 eligible patients, 1688 (76.76%) were assessed, 175 (7.95%) refused consent and 336 (15.28%) were unavailable. Access to patients was refused in some wards despite ethics approval. Data collection required 2 student nurses approximately 14 min per patient assessment.
Conclusion: In conducting a large multi-site point prevalence study, critical organisational processes were shown to influence the access to patients. This study demonstrated the impact of variation in Human Research Ethics Committee interpretations of protocols on consenting processes and the importance of communication and leadership at ward level to promote access to patients.
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1. Introduction

International researchers report that serious adverse events (SAEs) are common in hospitalized patients.[1–10] Such events are often preceded by signs of clinical deterioration that manifest as derangements in vital signs or new symptoms.[11–15] Rapid Response Teams (RRTs) comprise personnel skilled in resuscitating critically unwell patients. RRTs assess and treat hospital ward patients when they develop derangements in vital signs that fulfil predefined activation criteria.[16]. When a physician is the team leader of a RRT, it is termed a Medical Emergency Team (MET).[16] Although current data indicate that at least 60% of Australian ICU-equipped hospitals have implemented an RRT,[17] there is little information available about the overall prevalence of patients who fulfil MET criteria.[16] Research and media reports continue to highlight the occurrence and consequences of undetected deterio-

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* Corresponding author at: Cabrini-Deakin Centre for Nursing Research, Cabrini Institute, 183 Wattletree Road, Malvern 3144, Victoria, Australia.
Tel.: +61 3 95081426/92446529; fax: +61 3 95081368/92446159.
E-mail address: tracey.bucknall@deakin.edu.au (T.K. Bucknall).

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ration. Several National and State programs have been developed to enhance clinicians' recognition of and response to the deteriorating patient.[18–21]

At a recent international consensus conference, participants identified the lack of evidence to estimate the frequency of patient deterioration.[22] Indeed, the majority of prevalence studies have been limited to retrospective documentation audits.[22] that are subject to reporting bias and may not be a true measure of the frequency of the problem. Only two studies used prospective data collection for the purpose of identifying patients with abnormal vital signs that fulfilled the MET activation criteria.[11,23]

Fuhrmann et al.[23] conducted a single centre study across 5 wards in a Danish Hospital, gathering vital signs on 877 patients over a two-month period.[23] They found 18% of patients had abnormal vital signs and a 3-fold risk of death at 30 days. Similarly, Bell et al. undertook a prospective point-prevalence survey of RRT-calling criteria in hospital ward patients in a single Swedish hospital over two separate days.[11] They found that 4.5% of patients fulfilled RRT activation criteria, and that such patients suffered a 6-fold increased risk of death at 30 days. These investigators also reported several difficulties measuring vital signs and accessing patients for assessment.

To date, prospective multi-site studies reporting the prevalence of hospitalised patients who fulfil MET activation criteria compared with the actual number of activations have not been published. This lack of evidence compromises an organisation's ability to strategically address the issue and determine the appropriate resources. Given the deficiency in denominator data, we conducted a multicentre observational study to prospectively assess the prevalence of undetected medical emergencies and activation triggers of Medical Emergency Teams (METs).

To assist other investigators to replicate our study, this article describes in detail the methodology of the study. In particular, we outline the details of data collector training and barriers to accessing ward patients. In addition, we discuss variation in ethics committee requirements and interpretation of our study, and its impact on the study execution. Finally, we provide estimates on the number of data collector hours needed to assess an entire inpatient population.

2. Methods

2.1. Setting and participants

The study was undertaken in 10 hospitals in Victoria, Australia. All hospitals were equipped with an RRT in the form of a physician-led MET. Six of the 10 hospitals were public and four were private. Two were tertiary referral teaching hospitals, 7 were secondary referral centres, 1 was a metropolitan teaching hospital with limited critical care resources and 1 was located in regional Victoria. The mean hospitals beds were 249 (range: 145–387). All inpatients (including both adults and children) were eligible for inclusion except those located in intensive care units (ICU) or psychiatric wards.

2.2. Instrument

A case report form (CRF) was designed to collect patient information related to:

1. current vital signs (respiratory rate, heart rate, blood pressure, and pulse oximetry);
2. vital signs recorded in previous 24 h if any fulfilled MET criteria;
3. patient outcomes, including MET activations, unplanned ICU admissions, cardiac arrests and patient mortality at 30 and 60 days.

The CRF is shown in Appendix A.

2.3. Procedures

2.3.1. Ethics approval

All participating sites have formally constituted human research and ethics committees (HRECs) that oversee the conduct of human research. Researchers from each participating site submitted identical ethics applications using the National Ethics Application Form (NEAF) developed by the Australian National Health and Medical Research Council (NHMRC).[24] NEAF is an online common application form that can be used by all health disciplines to address relevant ethical considerations; it is acceptable across Australian jurisdictions that require human research ethics approval. The aim of the NEAF is to "assist HRECs to consistently and efficiently assess these proposals. It has been designed with the aim of increasing the efficiency and quality of the ethical review process for all parties involved".[24] Identical background information and protocols were concurrently submitted with the NEAF to all HRECs.

2.3.2. Data collector training

Forty-eight final year nursing students were recruited to perform a single set of vital signs and to scrutinize each patient's observation chart to determine the presence of MET activation criteria over the preceding 24 h. All students attended a 1-h induction and education session to ensure accurate and consistent data collection. Training included an explanation of the study aims, information about how to approach patients and explain the study, complete vital signs, complete the study CRF and assess the observation chart for the presence of MET criteria over the preceding 24 h.

Training involved groups of 1–15 nursing students and was conducted by the same senior clinical nurses and study investigators in all participating hospitals. An experienced (>10 years) nursing staff member from each hospital also attended the inductions in 8 of the 10 hospitals. Student competency to measure vital signs was assessed by having them measure vital signs of research staff and comparing them with vital signs collected prior to training session. Blood pressure was measured manually (pneumatically) using identical measuring equipment across all hospitals. Pulse rate was counted manually for 60 s. Respiratory rate was counted for 60 s by both visual inspection and by students' feeling the rise and fall of the patients' chests. Pulse oximetry was measured using available hospital equipment.

The method of explaining the study to the patient and why it was necessary to collect vital signs was rehearsed to ensure consistency. The CRF was explained in detail, examples were presented and scenarios depicting potential problems were discussed. Student nurses were introduced to the hospital-specific MET activation criteria where they were collecting data. This information was also used by the data collectors to assess observation charts for retrospective assessment of observations in the preceding 24 h.

2.3.3. Hospital preparation prior to data collection day

In each hospital, the site investigator obtained permission from the Director of Nursing to conduct the study and the Director of the Intensive Care Unit to obtain information on the RRT. Individualized letters were also sent to the Nurse Unit Managers (NUMs) of each ward by the study chief investigator and reminder emails were sent by the site investigator prior to the data collection day. One hospital required attendance at a meeting with NUMs prior to

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