Commentary

Medical emergency teams: deciphering clues to crises in hospitals

Michael DeVita

Associate Professor, Critical Care Medicine and Internal Medicine, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania, USA

Corresponding author: Michael DeVita, devitam@upmc.edu

Published online: 18 May 2005
This article is online at http://ccforum.com/content/9/4/325

Critical Care 2005, **9**:325-326 (DOI 10.1186/cc3721)

See related research by Jones *et al*. in this issue [http://ccforum.com/content/9/4/R303]

Abstract

Cardiac arrest in hospitals is usually preceded by prolonged deterioration. If the deterioration is recognized and treated, often death can be prevented. Medical emergency teams (MET) are a mechanism to fill this need. The epidemiology of patient deteriorations is not well understood. Jones and colleagues provide data regarding the temporal pattern of METs. They describe a diurnal variation to crises that strongly suggests hospital processes may systematically ignore (and find) patient deterioration. Hospitals in the future must develop methodologies to find more reliably patients who are in crisis, and then respond to them swiftly and effectively to prevent unnecessary deaths.

In 1994, Franklin and Mathew [1] recognized that cardiac arrests in hospitals are often preceded by prolonged physiologic deteriorations. These deteriorations not only presage patient deaths but they also offer an opportunity to recognize the crisis and trigger interventions that might be life saving. Since then, medical emergency team (MET) responses have been described by many authors, most notably several groups from Australia. Although there are no randomized clinical trials showing benefit from introduction of METs, many single center reports [2-4] support the notion that timely intervention may interrupt crisis events and decrease unexpected hospital mortality.

As a result of these reports and of the potential for improved outcomes they offer, organizations such as the Institute for Healthcare Improvement and the Society for Critical Care Medicine have been promoting rapid response teams and METs. In North America and in Europe, there now appears to be a rapid increase in number of organizations that have implemented a MET program, following a trend set in Australia. The medical literature is now rapidly growing as well, but it has been focused almost exclusively on either the benefits of METs in terms of reducing unexpected mortality or on the processes impacted on by METs (e.g. improved detection of process errors) [5].

What has not occurred is a characterization of the MET patient; for example, who is at risk, and what conditions and settings are dangerous? In other words, we do not understand the epidemiology of the MET patient. It is possible that there is a MET syndrome or syndromes. The syndrome(s) could be related to patient physiology during a dangerous time in their illness; perhaps each disease entity has an at-risk time for developing a medical crisis requiring a MET if no action is taken to prevent it. On the other hand, the MET patient may be instead a symptom of a hospital in crisis. In other words, the MET patient may be created by the environment and not the disease. To be sure, being 'sick' is a prerequisite for a MET, but at least one review of MET events seems to support the conclusion that METs prevent death because they intercept 'system' errors that lead to cardiac arrest [5,6]. Future analyses of MET events may provide the answer to the question, are hospitals sick?

Jones and colleagues [7], in their report in this issue of *Critical Care*, provide an early clue with their epidemiologic analysis of MET events. They describe data to support a commonly suspected association between time of day and the incidence of crisis recognition in hospitals. Their review of over 2000 events revealed an increase in events at certain times of the day, notably near nursing handoffs and physician rounding. Their data, although observational, strongly suggest a 'sick hospital' syndrome. Although it is possible that subsets of their patient population all happened to deteriorate when staffing increased or physicians visited, this is unlikely. A diurnal pattern for physiologic deteriorations would be unexpected, given the diverse causation of MET events. A more reasonable explanation for the observation is that the

MET = medical emergency team.

more care givers that visit a patient, the more likely they are to detect patient deteriorations. Although Jones and his co-authors describe an increase in the number of events during 'off hours' as noted in their Fig. 2, their Fig. 1 tells a different story; the hourly rate of MET events is lower during the off hours. This suggests that patients who are deteriorating are not reliably recognized at night. Instead, they may accumulate, only to be found at the end, or beginning, of work shifts or during scheduled visits. If the findings of Jones and coworkers are correct, then the conclusion one must draw is that hospitals may have a design flaw – they do not reliably find patients who are exhibiting clinical deterioration. This flaw exists even though the hospital described possesses a mature MET program. An alternative hypothesis is that MET calls increase during daylight hours because of an increase in inappropriate MET activations. Future studies will need to address this possible explanation.

Jones and co-authors describe their findings in a hospital with a long history of MET responses. It is doubtful that their findings are the result of inadequately trained staff (and inappropriate activations of the MET). Their hospital has overcome two of the biggest obstacles to MET implementation: teaching staff to recognize crisis and motivating staff to call for help when they find one. They have developed crisis criteria and created mnemonic tools such as pocket cards and wall posters. They have created a culture that rewards those who utilize the MET system, and a culture that reliably recognizes and utilizes a standardized response to crisis.

Even so, there is evidence in the report that workers at night are unable to find the crisis as frequently as are staff during the day. The data presented indicate that when staffing is better crisis detection increases. This implies that at other times the staffing is inadequate or unavailable.

If other authors corroborate these findings, then the inescapable conclusion will be that hospitals do not reliably find patients in crisis, which is an obviously dangerous situation. To respond to this finding, a redesign is in order. Hospitals need some form of improved detection system, involving increased staffing, more frequent visits, or more frequent use of monitoring, perhaps in every hospitalized patient. It is unlikely that staffing will increase because of cost considerations, although a work redesign is possible. However, it is obvious that care givers cannot remain with patients all the time. The alternative, continuous monitoring of all hospitalized patients (e.g. with pulse oximetry) is less expensive and may be life saving. If continuous monitoring detects crisis situations better, then one would expect the diurnal variation curve to flatten out, and it would prove to be a remedy to the sick hospital syndrome. A third option is to study rigorously the MET syndrome and apply findings by better selection of patient monitoring.

In any case, Jones and coworkers have presented important data that should alter our perspective. Hospitalized patients are sick, and they may be in sick hospitals. A MET response addresses one half of the need – it is a process to save reliably those patients who are in crisis. Our challenge is to create an around-the-clock system that efficiently finds deteriorating patients.

Competing interests

The author(s) declare that they have no competing interests.

References

1. Franklin C, Mathew J: **Developing strategies to prevent in-hospital cardiac arrest: analyzing responses of physicians and nurses in the hours before the event.** *Crit Care Med* 1994, **22:** 244-247.
2. Bellomo R, Goldsmith D, Uchino S, Buckmaster J, Hart GK, Opdam H, Silvester W, Doolan L, Gutteridge G: **A prospective before-and-after trial of a medical emergency team.** *Med J Aust* 2003, **179:**283-288.
3. Buist MD, Moore GE, Bernard SA, Waxman BP, Anderson JN, Nguyen TV: **Effects of a medical emergency team on reduction of incidence of and mortality from unexpected cardiac arrests in hospital: a preliminary study.** *BMJ* 2002, **324:**387-390.
4. Bristow PJ, Hillman KM, Chey T, Daffurn K, Jacques TC, Norman SL, Bishop GF, Simmons EG: **Rates of in-hospital arrests, deaths and intensive care admissions: The effect of a medical emergency team.** *Med J Aust* 2000, **173:**236-240.
5. Braithwaite RS, DeVita MA, Mahidhara R, Simmons RL, Stuart S, Foraida M, members of the Medical Emergency Response Improvement Team (MERIT): **Use of medical emergency team (MET) responses to detect medical errors.** *Qual Saf Health Care* 2004, **13:**255-259.
6. Hodgetts TJ, Kenward G, Vlackonikolis I, Payne S, Castle N, Crouch R, Ineson N, Shaikh L: **Incidence, location and reasons for avoidable in-hospital cardiac arrest in a district general hospital.** *Resuscitation* 2002, **54:**115-123.
7. Jones D, Bates S, Warrillow S, Opdam H, Goldsmith D, Gutteridge G, Bellomo R: **Circadian pattern of activation of the medical emergency team in a teaching hospital.** *Crit Care* 2005, **9:**R303-R306.