

Activities of a medical emergency team twenty years after its introduction

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ABSTRACT

Introduction: We describe and quantify the wide range of activities that a mature Medical Emergency Team can progressively perform.

Methods: The activities performed by a Medical Emergency Team 20 years after its introduction were prospectively collected during 105 consecutive days.

Results: the main activity was focused on the follow-up visits to previously treated critically ill patients (mean 7.5 visits/die in working days, 5.1 in the others). A large amount of other scheduled or unscheduled activities (like sedation or analgesia for diagnostic procedures, central venous line placement, phone consultation regarding critical care aspects of treatments) were performed: on average, 7.3 side-activities/die in working days and 5.2 in the others. First consultations in patients not previously seen were on average 3.1/die on working days, 2.4 in the others. Cardiac arrest accounted for 27 (9%) of first time visits.

Conclusions: A Medical Emergency Team can progressively perform many kinds of activities. An evaluation limited to the reduction of in-hospital cardiac arrests or a too early assessment may underestimate its beneficial effects on the Hospital complexity.

Keywords: *medical emergency team, rapid response team, cardiac arrest, prevention, quality of care.*

INTRODUCTION

The incidence of in-hospital cardiac arrest (IHCA) ranges from 1 to 5 events/1000 admissions (1, 2), with a surviving rate of 20% (3).

The number of patients suffering from severe adverse events is about 15-20% of the admitted patients (4-6). Severe adverse events and IHCA are often preceded by worsening clinical conditions lasting hours or days (7-9).

A timely treatment could avoid further worsening: Hodgetts reported that 60% of IHCA could be prevented (2).

Medical Emergency Teams (MET) aim to reduce IHCA, deaths and unanticipated intensive care unit (ICU) admissions (10).

National and international authorities advocate the creation of rapid response systems (RRS) (11, 12). Nevertheless, a recent review reported a weak evidence in favour of RRS (13).

There is no study evaluating the enlargement of the activities performed by the MET.

Gradually, the competence and skills of its members may interact with the complex-

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ing theatre. To preserve the rapidity of the response, a second anaesthesiologist was available in case of emergency. Patients visits were divided into “First Visits” and “Follow-Up Visits”.

Number of Follow-up visits to survivors was collected and divided into day and night visits and those performed in working-days or non-working-days (*Table 1*).

The MET (always present in the Hospital) planned the timing of his further visits. Taking into account patient’s conditions and “do not attempt resuscitation” (DNAR) status, the MET evaluated if the patient could be safely treated in his ward.

Several side-activities, including sedation (e.g. for biopsy during fiberoptic bronchoscopy, for Magnetic Resonance in claustrophobic patients, for long lasting radiological procedures in anxious patients), analgesia for painful procedures, monitoring during high-risk procedures, or central venous catheterisation were performed.

Data are shown as mean and standard deviation or number and percentage.

RESULTS

During 105 consecutive days, 1704 visits were performed (*Table 1*).

First visits (301 in 301 patients) were followed by follow-up visits (707 in 212 survivors who were not transferred to the ICU or to other hospitals, mean 7.5 visits/die in working days, 5.1 in the others). Further 696 visits (“side-activities”) were performed: on average, 7.3 side-activities/die in working days and 5.2 in the others.

First time visits (on average 3.1/die on working days, 2.4 in the others) were mostly performed in patients with acute respiratory failure (124 patients, 41%). Cardiac arrest accounted for 27 (9%) of first time visits (*Figure 1*).

During the 301 first time visits the MET performed 506 interventions (*Figure 2*), the most frequent (17%) being diagnostic examination such as transfer to the CT room.

More than half (77/124 = 62%) of the patients with acute respiratory failure re-

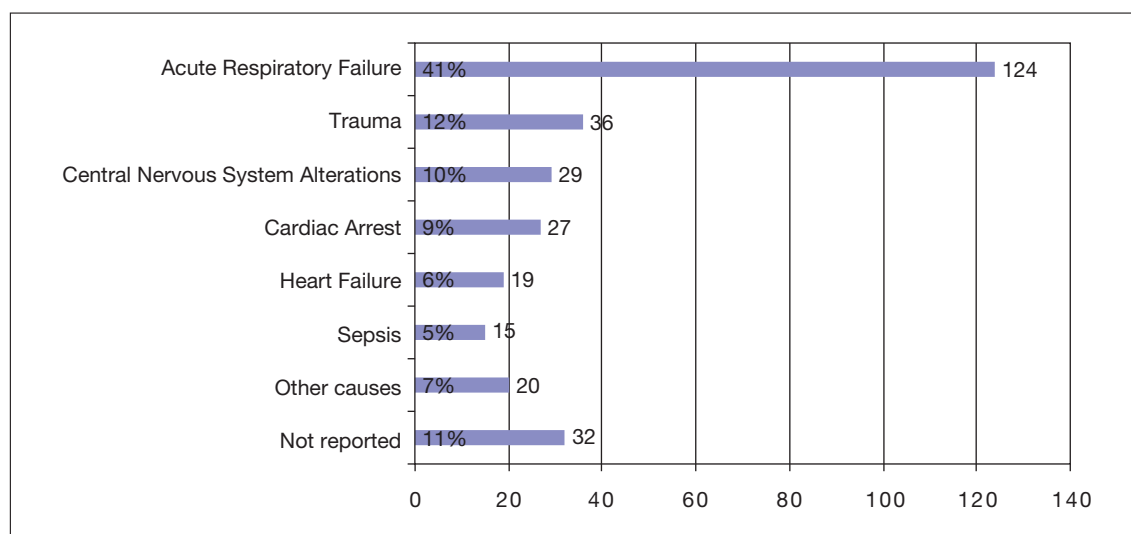


Figure 1

Causes of the first visit in 301 consecutive critically ill patients outside the ICU over 105 days.

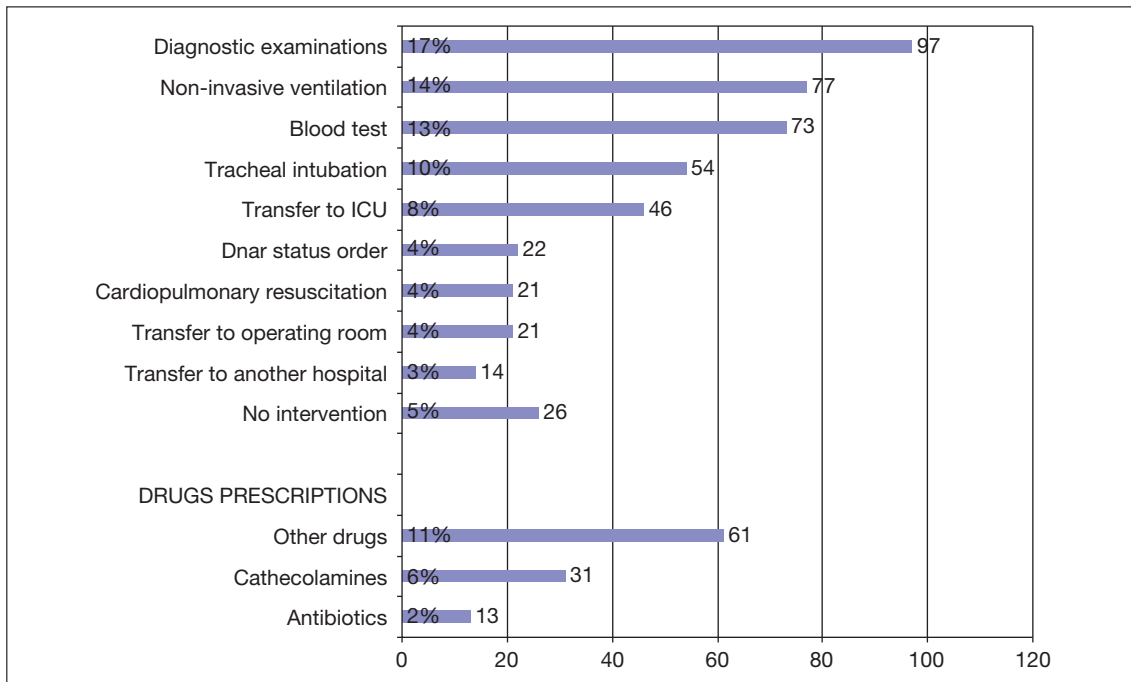


Figure 2
506 interventions performed during the first visit to 301 consecutive critically ill patients outside ICU over a 105 day-period.

ceived non-invasive ventilation. Patients with cardiac arrest received cardiopulmonary resuscitation (21/27 = 78 %) or had DNAR status (6/27 = 22 %).

Only 26 patients (9 % of the patients didn't undergo any intervention).

Less than once a day (82 times in the 105-days study period) the MET was facing a previous call or a scheduled procedure and a second anaesthesiologist was called to perform the task of the MET.

DISCUSSION

This is the first attempt to give a general picture of the activities performed by a MET several years after its introduction. The demand for intensive care beds, at least in European Countries, exceeds their availability.

Many critically ill patients are managed outside ICU, but the required level of care for these patients may exceed the capability of general wards, increasing the rate of IHCA compared to similar patients admitted in ICU (2,14).

The MET is one of the possible efferent limbs of a RRS; when characterized by full critical care capabilities, it should minimize the gap between needs and resource (11).

However, Galhotra reported a relevant incidence of avoidable IHCA 16 years after the introduction of a MET (15).

A recent review found only a weak evidence in favour of RRS (13) focusing on the reduction of in hospital mortality and IHCA, but the potential benefits of MET, as stated by the same authors, may extend to other significant outcomes.

In this paper we report a wide spectrum

of side-activities. During twenty years the requests to the MET increased in number and heterogeneity; several organisational re-arrangements were adopted such as the introduction of one anaesthesiologist dedicated to the Acute Pain Service and to the Endoscopy service. Anaesthesiologists were also forced to formulate local policies on several topics, like non-invasive ventilation outside ICU (16).

The most commonly performed MET activity in the study period was represented by follow up visits in critically ill patients. The best clinical criteria to identify at-risk patients are yet to be defined (17). Even in the absence of defined criteria to alert the MET in our hospital, only 26 out of 301 first calls did not require any intervention; a little percentage of inappropriate calls must be considered acceptable to preserve the easiness of access to the MET.

Limitations

An evaluation of the positive effect of the MET on the global performance of our hospital has never been performed: the efficiency of this model as compared to others remains unknown (13). The MET in the present study was composed by anaesthesiologists only. Likely, other specialists could have detected other mismatches in health care processes, and offered other kinds of activities.

Data collection took place in a single centre: our results cannot be generalized. We limited the data collection to 105 days: our study did not aim to report the activity of the MET from its introduction (or to document its progressive widening), but only to describe the heterogeneity of the activities and the potential work-load associated with the extending of the MET duties.

As the MET was already present in the Hospital, an evaluation of its efficacy in reducing unexpected ICU admissions was not possible.

CONCLUSIONS

A MET can progressively perform different kinds of activities. In our experience 40.8 % of interventions were represented by side-activities and 41.5 % by follow-up visits of critically ill patients. Cardiac arrest only accounted for 1.5 % of the activity.

The beneficial effects on the Hospital system provided by the MET can be grossly underestimated when evaluating only in-hospital cardiac arrest rates.

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REFERENCES

1. Skogvoll E, Isern E, Sangolt GK, et al. In-hospital cardiopulmonary resuscitation. 5 years' incidence and survival according to the Utstein template. *Acta Anaesthesiol Scand* 1999; 43: 177-184.
2. Hodgetts TJ, Kenward G, Vlachonikolis IG, et al. Incidence, location and reasons for avoidable in-hospital cardiac arrest in a district general hospital. *Resuscitation* 2002; 54: 115-123.
3. Sandroni C, Nolan J, Cavallaro F, et al. In-hospital cardiac arrest: incidence, prognosis and possible measures to improve survival. *Intensive Care Med* 2007; 33: 237-245.
4. McGlynn EA, Asch SM, Adams J. The quality of health care delivered to adults in the United States. *N Engl J Med* 2003; 348: 2635-2645.
5. Brennan TA, Leape LL, Laird N, et al. Incidence of adverse events and negligence in hospitalized patients: results of the Harvard Medical Practice Study I. *N Engl J Med* 1991; 324: 370-376.
6. Bellomo R, Goldsmith D, Russell S, et al. Post-operative serious adverse events in a teaching hospital: a prospective study. *Med J Aust* 2002; 176: 216-218.
7. Buist MD, Jarmolowski E, Burton PR, et al. Recognizing clinical instability in hospital pa-

- tients before cardiac arrest or unplanned admission to intensive care. *Med J Aust* 1999; 171: 22-25.
8. Franklin C, Mathew J. Developing strategies to prevent inhospital cardiac arrest: analyzing responses of physicians and nurses in the hours before the event. *Crit Care Med* 1994; 22: 244-247.
 9. Schein RM, Hazday N, Pena M, et al. Clinical antecedents to in-hospital cardiopulmonary arrest. *CHEST* 1990; 98: 1388-1392.
 10. Hillman K, Parr M, Flabouris A, et al. Redefining in-hospital resuscitation: the concept of the medical emergency team. *Resuscitation* 2001; 48: 105-110.
 11. DeVita M, Bellomo R, Hillman K, et al. Findings of the first consensus conference on medical emergency teams. *Crit Care Med* 2006; 34: 2463-2478.
 12. Savoia G, Bosco G, Cerchiari E, et al, for SIAARTI - IRC Working Group. SIAARTI - IRC recommendations for organizing responses to in-hospital emergencies. *Minerva Anestesiologica* 2007; 73: 533-553.
 13. Winters BD, Pham JC, Hunt EA, et al. Rapid response systems: a systematic review. *Crit Care Med* 2007; 35: 1238-1243.
 14. Simchen E, Sprung CL, Galai N, et al. Survival of critically ill patients hospitalized in and out of intensive care unit beds. *Crit Care Med* 2004; 32: 1654-1661.
 15. Galhotra S, DeVita M, Simmons RL, et al. Mature rapid response system and potentially avoidable cardiopulmonary arrests in hospital. *Qual Saf Health Care* 2007; 16: 260-265.
 16. Cabrini L, Idone C, Colombo S, et al. Medical Emergency Team and non-invasive ventilation outside ICU for acute respiratory failure. *Intensive Care Medicine* 2009; 35: 339-343.
 17. Subbe CP, Gao H, Harrison DA. Reproducibility of physiological track-and-trigger warning systems for identifying at-risk patients on the ward. *Intensive Care Med* 2007; 33: 619-624.