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Preventable deaths and potentially preventable deaths. What are our errors?

Sandra Montmany [a,*], Anna Pallisera [b,1], Pere Rebasa [c,2], Andrea Campos [d,2], Carme Colilles [e,2], Alexis Luna [c,2], Salvador Navarro [c,2]

[a] General Surgery, Hospital Universitari Parc Taulí, C. Sant Llorenç, 14–1r1a, 08202 Sabadell, Spain
[b] General Surgery, Fundación Hospital Son Llàtzer, Carretera de Manacor, 4, 07198 Son Ferriol, Islas Baleares, Spain
[c] General Surgery, Hospital Universitari Parc Taulí, Parc Taulí, s/n, 08208 Sabadell, Spain
[d] General Surgery, Hospital Universitari Parc Taulí, Parc Taulí, s/n, 08208 Sabadell, Spain
[e] Anesthesiology, Hospital Universitari Parc Taulí, Parc Taulí, s/n, 08208 Sabadell, Spain

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ABSTRACT

Background: A variety of systems have been applied to identify and address errors in the management of multiple trauma patients. This lack of standardisation represents a serious problem.
Objectives: Detect preventable and potentially preventable deaths, and classify all the errors with universal language.
Methods: We studied all trauma patients over 16 admitted to the critical care unit or who died before. In multidisciplinary sessions we decided which deaths were preventable, potentially preventable and non preventable. Guided by ATLS protocols, we detected errors in their management that were classified using the taxonomy of Joint Commission.
Results: We registered 1236 trauma patients (ISS 20.77). Of the 115 trauma deaths, 19 were preventable or potentially preventable deaths. We recorded 130 errors in all deaths, 46 of them in preventable or potentially preventable deaths.

Using our own classification, the main errors were delay in starting correct treatment or performance of CT in hemodynamically unstable patients.

Using the taxonomy of Joint Commission, the main type error was clinical, during the intervention: the delay in initiating correct treatment. Mistakes were made in the emergency department by medical specialists. The incidence of therapeutic and diagnostic errors was similar. The main cause of error was human failure, specifically 'rule-based' errors
Conclusions: Measuring and recording the results is the first step on the way to improving the quality of care for trauma patients. A common language like the taxonomy of Joint Commission will help standardise patient safety data, thus improving the recording of incidents and their analysis and treatment.

Introduction

Multiple trauma remains a major cause of death in people under the age of 40 [1]. Improving the treatment of trauma patients and reducing mortality requires the kind of systematic and priority-based management established by the "Advanced Trauma Life Support (ATLS)" program [2,3]. Patient management should also be addressed by implementing protocols that address all aspects of care, including prehospital systems, appropriate triage and resuscitation [4]. However, assessments of the quality of treatment given to multiple trauma patients suggest that it often fails to meet the established standards [4,5].

A variety of systems have been applied to identify and address errors in the management of multiple trauma patients [4,5], but unfortunately, there is no widespread agreement on the terminology that should be used in patient safety information systems. This lack of standardisation represents a serious problem for the analysis of the quality of multiple trauma patient management and of the mortality rates in this population.

* Corresponding author. Tel.: +34 636747272/+34 937231010; fax: +34 937160646.
E-mail addresses: sandra.montmany@gmail.com (S. Montmany), apallill@gmail.com (A. Pallisera), prebasa@tauli.cat (P. Rebasa), acampos@tauli.cat (A. Campos), ccolilles@tauli.cat (C. Colilles), aluna@tauli.cat (A. Luna), snavarro@tauli.cat (S. Navarro).
[1] Tel.: +871202000.
[2] Tel.: +937231010; fax: +937160646.

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In 2005, the "Joint Commission on the Accreditation of Healthcare Organisations (JCAHO)" [6] published a meta-analysis to standardise the various definitions and concepts regarding the causes of error. The errors are classified in five different categories: Impact, Type, Domain, Cause and Prevention and Mitigation, with further sub-classifications for each of the categories. Regardless of the methodology used, it is essential to analyze the errors made in order to analyze the quality of trauma patient management and the type of mortality.

Mortality in multiple trauma patients can be divided into three types: preventable, potentially preventable and non-preventable. The definition of each type of mortality is controversial. According to a systematic review published by Costanti et al. [7], 89.7% of the publications define these three types of mortality using clinical guidelines such as ATLS; 62.1% define them according to criteria of severity such as the "Injury Severity Score" (ISS) [8]; 55.2% according to the survival rate determined by the "Trauma–Injury Severity Score" (TRISS) [9] and 3.4% by a combination of elements such as patient comorbidity, initial physiological condition on arrival, the anatomical injuries present, and so on. Following the classification of mortality according to the analysis of the errors, preventable deaths are those caused directly by an avoidable error, potentially preventable deaths are those that might have been caused by a preventable error, and non-preventable deaths are those that occur regardless of any errors in the patient's management [10–15].

Most authors who analyze the quality of care for trauma patients by describing the mistakes that have caused preventable or potentially preventable deaths, use their own classification of these errors [16–26]. The use of different classifications makes it difficult to establish a reference point in the analysis of the effect of errors. By using a standardised terminology and classification like the ones proposed by the JCAHO [6] and like others that are widely applied in other clinical fields of medicine, errors can be logged, analysed and addressed. This system also provides a reference point for identifying problems and solutions at a single centre and allows comparisons with other centres and studies. To date, only Ivatury et al. [11] and Vioque et al. [10] have applied the JCAHO taxonomy in the analysis of the errors that cause preventable and potentially preventable mortality in trauma patients.

In this study we analyze the mortality rate in our series, detecting above all preventable and potentially preventable deaths. The secondary objective of the study is to classify all the errors detected using a common standard language like the one proposed by the JCAHO, so as to be able to perform an analysis of the quality of care of our multiple trauma patients.

Material and methods

Retrospective, descriptive study including patients prospectively entered into a secured database from March 2006 until the present. The database records all multiple trauma patients aged over 16 admitted to the critical care unit or who died before admission. The study included patients registered in the database from March 2006 until December 2014 who were dead, excluding those under 16 years of age and those who died before reaching the hospital.

The following variables are recorded for each case: age, sex, mechanism of action, ISS [8], Revised Trauma Score (RTS) [27], prehospital and hospital vital signs, laboratory tests, diagnosis and treatment of each injury, complications and outcome. If the patient died, the date and cause of death are specified.

For this study, it has been used the classification of mortality according to the analysis of the errors: preventable deaths are those caused directly by an avoidable error, potentially preventable deaths are those that might have been caused by a preventable error, and non-preventable deaths are those that occur regardless of any errors in the patient's management. Preventable errors were also taken to include those caused by to the failure to comply with the guidelines established in the ATLS clinical guide [2].

Multidisciplinary sessions were attended by surgeons, anaesthesiologists, intensivists and doctors from various specialties depending on the case at hand (neurosurgeons, orthopaedic surgeons, vascular surgeons, and so on). It is an independent group, although in some cases we have had clinicians involved in the case. At each session all errors were discussed and the committee established whether or not the error was the cause of death. Each death was thus classified as preventable, potentially preventable or non-preventable.

Each of the errors was analysed and classified according to the JCAHO taxonomy [6].

Results

From March 2006 to December 2014, 1236 trauma patients were prospectively recorded. Their mean ISS was 20.77 (SD 15.6).

One hundred and twenty-two patients died, representing an overall mortality of 9.8%. Seven patients were excluded from the study: four whose entire clinical course could not be assessed because they were referred to our centre to receive specific treatment and then returned to their post-intervention centre; two who arrived in cardiac arrest and in whom cardiopulmonary resuscitation was performed without success; and one cirrhotic patient who was transferred to our centre one month after admission for melena and who died of encephalopathy.

We finally included 115 multiple trauma patients who died during hospitalisation, Ninety-six were non-preventable deaths, 13 potentially preventable and six preventable. Therefore, preventable or potentially preventable deaths accounted for 16.5% of all deaths, and occurred in 1.53% of all registered patients.

The most frequent cause of death was central nervous system (CNS) injuries (46%) followed by hypovolemic shock (32%). But in cases of preventable or potentially preventable death, the leading cause of mortality was hypovolemic shock (37%), followed by CNS injuries (26%). Multiple organ failure was the third leading cause of death, regardless of whether the death was preventable, potentially preventable or non-preventable (Table 1).

We recorded 130 preventable errors in the 115 patients: 84 errors in the non-preventable mortality group and 46 errors in the preventable or potentially preventable mortality group (15 errors in preventable mortality and 31 errors in the potentially preventable mortality). Forty-eight patients in the non-preventable mortality group had no errors in their management.

Table 1
Causes of mortality.

	Overall (115 deaths)		Preventable and potentially preventable (19 deaths)	
Causes of mortality	Central nervous system injuries	53 (46%)	Central nervous system injuries	7 (37%)
	Hypovolemic shock	36 (32%)	Neurological death	5 (26%)
	Multiple organ failure	11 (9%)	Multiple organ failure	3 (16%)
	Respiratory	11 (9%)	Respiratory	3 (16%)
	Cardiac	4 (4%)	Cardiac	1 (5%)