Clinical significance of palliative care assessment in patients referred for urgent intensive care unit admission: A cohort study ☆

Joao Gabriel Rosa Ramos, MD [a,b,c,*], Mario Diego Teles Correa, MD [a,d], Ricardo Tavares de Carvalho, MD, PhD [e], Daryl Jones, BSc(Hons), MBBS, FRACP, FCICIM, MD, PhD [f,g,h], Daniel Neves Forte, MD, PhD [i,j]

[a] Medical Sciences PhD Program, University of Sao Paulo Medical School, Sao Paulo, Brazil
[b] Intensive Care Unit, Hospital Sao Rafael, Salvador, Brazil
[c] UNIME Medical School, Lauro de Freitas, Brazil
[d] Intensive Care Unit, Hospital Sao Camilo, iMED group, Sao Paulo, Brazil
[e] Palliative Care Team, Hospital das Clinicas, University of São Paulo Medical School, Sao Paulo, Brazil
[f] Monash University, School of Public Health and Preventive Medicine, Melbourne, Australia
[g] University of Melbourne, Melbourne, Australia
[h] Austin Health, Melbourne, Australia
[i] Intensive Care Unit, Emergency Medicine Discipline, Hospital das Clinicas, University of Sao Paulo Medical School, Sao Paulo, Brazil
[j] Palliative Care Team, Hospital Sirio-Libanes, Sao Paulo, Brazil

ARTICLE INFO

ABSTRACT

Purpose: To evaluate clinical characteristics of patients with palliative care (PC) and urgent intensive care unit (ICU) referrals in the same hospital admission.
Methods: All urgent ICU referrals at an academic, tertiary hospital, and the co-occurrence and timing of PC assessment were retrieved from a prospectively collected database.
Results: From May 2014 to May 2015, 2476 patients were analyzed and 179 (7%) had co-occurrence of PC assessment and urgent ICU referral in the same hospital admission. Hospital mortality was higher (odds ratio, 8.3; 95% confidence interval, 5.4-12.7) and ICU admission was lower (odds ratio, 0.54; 95% confidence interval, 0.40-0.74) in patients with PC assessment, compared with patients without concurrent PC and ICU referrals. Variables associated with PC assessment were older age, diagnosis of cancer, depressed level of consciousness, nonsurgical admission, lower performance status, physician's subjective prognosis of poor outcome, and length of hospitalization before ICU referral.
Conclusion: In this cohort of patients with urgent ICU referral, clinical characteristics at the moment of ICU referral were associated with co-occurrence of PC assessment in the same hospital admission. These characteristics might guide the development of instruments to enhance early referral of high-risk patients to PC services.

© 2016 Elsevier Inc. All rights reserved.

1. Introduction

The global burden of critical illness is high and is likely to increase as the population ages [1]. In the United States, for instance, it has been estimated that roughly 1 in 5 Americans die using intensive care unit (ICU) services [2]. Moreover, perceptions of inappropriate care in the ICU are reported frequently worldwide [3,4] and much of that care may be seen as nonbeneficial or not consistent with patients' values and preferences [5].

There are several key steps in the evolution of decision making in relation to end-of-life situations in the hospital, from the admission of an at-risk patient to the occurrence of an acute deterioration and its management in the critical care setting [6]. Advanced care planning or palliative care (PC) referral in the wards or during ICU stay may reduce inappropriate ICU admissions and ICU length of stay [7]. In addition, rapid response systems activation during acute deterioration has been associated with modifications in goals of care decisions [8]. However, although it has been suggested that such acute deterioration events could be used as indicators to trigger PC assessment [9], there is little research on the epidemiology of deteriorating patients in the hospital to help discriminating which patients would benefit from such assessment [10,11].

Co-occurrence of PC assessment and urgent ICU referral in the same hospital admission could be used as a marker for high-risk patients that may benefit from goals of care discussions. The aim of this study was to evaluate clinical characteristics at the moment of urgent ICU referral

that could differentiate patients with concurrent PC and ICU referral from patients with ICU referral only.

2. Methods

2.1. Ethics, consent, and permission

This study was approved, and a waiver for informed consent was granted, by the Hospital das Clinicas da Faculdade de Medicina da Universidade de Sao Paulo (HCFMUSP) research ethics committee (approval number 638.864).

2.2. Setting

The Central Institute of the HCFMUSP is an academic, tertiary hospital with about 1100 hospital beds and 110 ICU beds, divided in 10 ICUs. The Central Institute is a referral center for acutely ill medical, surgical, and trauma patients and also for elective medical and complex surgery patients, including solid organ transplantation. The ICUs are closed units, staffed by intensivists and medical residents, and all resources are available at a 24/7 schedule. There is also an intermediate care unit at the emergency department, which receives patient from the emergency department and is staffed by emergency medicine physicians and internal medicine residents, with diurnal rounds from Monday to Friday by an intensive care physician. Cardiac (including cardiac surgery) patients are, most of the time, admitted at other facilities in the complex.

The PC team comprises a multidisciplinary team specialized in PC. Palliative care assessments were made after referral by the primary medical team and there was no institutional mechanism to trigger the PC evaluation. Referrals were received from all inpatient units. The PC team was available from Monday to Friday, during work hours. The entire team would meet with the patient/relatives and then collaborated with the attending physicians regarding the most appropriate care for each patient. The PC team did not admit acute patients directly to their service, but, when necessary, after assessment and collaboration with the primary medical team and patient/relatives, it would be possible to transfer the patient to the PC ward or affiliated hospice.

2.3. Study design

All urgent ICU admission referrals at HCFMUSP Central Institute from May 2014 to May 2015 were evaluated. Only the first ICU admission referral was analyzed and patients younger than 16 years were excluded. All data were retrieved from prospectively collected databases that were not designed for the specific purpose of this study.

An *urgent ICU referral* was defined as a nonscheduled request for ICU admission made by the physician, whether or not the patient was actually admitted to the ICU. A *PC assessment* was defined as an evaluation by the PC team, after request by the primary medical team, that occurred in the same hospital admission of the urgent ICU referral. The *ICU admission* was defined as admission to one of the ICUs in a 7-day period after an urgent ICU referral.

The included patients were grouped into the following: (A) patients for whom only urgent ICU admission was requested during the hospital admission (ICU only) and (B) patients for whom urgent ICU admission referral and PC assessment were made during the same hospital admission (ICU and PC), which was further divided into the following: (B.1) patients for whom PC assessment was made before urgent ICU referral (PC before ICU) and (B.2) patients for whom PC assessment was made after urgent ICU referral (PC after ICU).

Patients' characteristics were collected from the ICU request form, an obligatory standardized form for ICU referral that was filled by the physician in charge of the patient at the moment of ICU referral. This form comprises patients' characteristics, such as physiological variables, comorbidities, reason for ICU referral, performance status, and also the

attending physician's subjective prognosis of survival if the patient was to be admitted to the ICU. Characteristics were also retrieved from the PC assessment form, which is filled by the PC team in the first evaluation and during follow-up. Patients were followed up until hospital discharge or death.

Severity of acute illness was measured by the Mortality Probability Model (MPMII0) score [12]. Performance status was measured by a modification of the Katz activities of daily living (ADLs) [13], in which patients were classified as functionally independent (independent for all ADLs), partially dependent (independent for 3-5 ADLs), and severely dependent (capable of performing a maximum of 2 ADLs) and, in those evaluated by the PC team, by the Palliative Performance Scale (PPS) [14]. Physician's subjective prognosis was assessed as a 3-stage categorical variable: probable survival without severe disabilities, survival with severe disabilities, or no survival.

2.4. Statistical analysis

Microsoft Excel 2013 (Microsoft, Redmond, Wash) and Microsoft Access 2013 (Microsoft) were used as database software. Statistical analyses were performed with SPSS 13.0 (SPSS Inc, Chicago, Ill) or EpiInfo 7 for Windows (Centers for Diseases Control and Prevention, Atlanta, Ga). Categorical variables were described as numbers of cases (percent). Continuous variables were described as mean $\pm$ SD or median (interquartile range [IQR]), depending on normality of distribution. Differences in proportions were evaluated with the χ^2 statistics or Fisher exact test, where appropriate. Differences in means and medians were evaluated with analysis of variance test or Mann-Whitney U test, where appropriate. Patients transferred to other facilities were excluded from hospital mortality analysis, because their survival status was unknown.

We performed multiple logistic regression to identify variables independently associated with PC assessment. The variables selected were those found to be significantly correlated on univariate analysis. Variables were tested for correlation before they were entered in the model. Physician's subjective prognosis was entered as a dichotomous variable; good outcome (ie, survival without disabilities) vs poor outcome (ie, survival with severe disabilities or no survival), as was performance status (dependent vs independent). Length of hospitalization before ICU referral was divided into quartiles and entered as a categorical variable to ensure linearity. The final covariate model was developed by a stepwise procedure with backward elimination using Wald statistic. Goodness-of-fit was tested by the Hosmer and Lemeshow statistic. A 2-tailed P value less than .05 was considered significant in all comparisons.

3. Results

From May 2014 to May 2015, there were 44 291 admissions to the hospital. There were 3115 urgent ICU referrals, of which 639 were excluded (612 repeated requests and 27 requests for patients younger than 16 years), leaving 2476 patients for final analysis. In the period of the study, there were 843 PC assessments (Figure).

3.1. Characteristics of the cohort

There were 179 (7%) patients with ICU and PC assessment in the same hospital admission (ICU and PC) and 2297 (93%) patients with sole ICU referral (ICU only; Table 1). Overall, 1270 (52%) patients were on the wards at the time of ICU referral, median age was 57 (IQR, 42-69) years, and 1378 (55.7%) patients were male. Median MPMII0 score was 0.20 (IQR, 0.09-0.57), and 620 (25%), 678 (27.4%), 242 (9.8%), and 308 (23.1%) patients received vasoactive drugs, underwent invasive mechanical ventilation, were in need of urgent renal replacement therapy, and were in need of monitoring for urgent surgery, respectively. One thousand five hundred fifty-one (62.9%) patients were admitted