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Critically ill elderly patients in a developing world—mortality and functional outcome at 1 year: A prospective single-center study ☆,☆☆,★

Swagata Tripathy, MD, DNB, IDCC, EDIC [a,*], J.C. Mishra, MD [b], S.C. Dash, MD, DM, FRCP [c]

[a] Department of Trauma and Emergency Medicine, All India Institute of Medical Sciences, Bhubaneswar, India
[b] Department of Anaesthesia and Intensive Care, Kalinga Institute of Medical Sciences, Bhubaneswar, India
[c] Department of Nephrology, Kalinga Institute of Medical Sciences, Bhubaneswar, India

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ABSTRACT

Purpose: To study the mortality and outcome of critically ill elderly patients in a developing country with focus on nutritional and socioeconomic status.
Methods: A prospective study of 109 patients (215 screened) admitted consecutively to the intensive care unit from 2011 to 2012. Demographics, Acute Physiology and Chronic Health Evaluation (APACHE) II score, mechanical ventilation, Malnutrition Universal Screening Tool score, socioeconomic category, functional status, delirium, and length of stay were recorded. Telephonic assessment of outcome was done at 1 year. Appropriate statistical tests compared differences between subgroups. Multivariate analysis was performed on significant variables ($P < .1$) affecting mortality.
Results: At 12 months after discharge, 46.8% of patients (mean age, 76.5 ± 9.6 years; APACHEII, 22.7 ± 6.4; and intensive care unit stay, 7.8 ± 3.4 days) had died. Risk factors for mortality at 12 months were APACHE II score ($P < .001$; odds ratio [OR], 1.2; 95% confidence interval [CI], 1.1-1.3), severe malnutrition ($P = .006$; OR, 0.08; 95% CI, 0.01-0.48), and delirium ($P = .03$; OR, 0.32; 95% CI, 0.11-0.9). Risk factors for short-term mortality (at 28 days) were APACHE II score ($P = .02$; OR, 1.1 [1.0-1.2]) and premorbid functional status ($P = .03$; OR, 0.2 [0.1-0.8]). Kaplan-Meier survival analysis showed a significant association with malnutrition (log-rank test, $P = .012$) but not with socioeconomic category. Most (72%) of the survivors had a favorable functional status.
Conclusions: Malnutrition, delirium, and APACHEII were risk factors for long-term mortality. Survivors had a good functional outcome. Appropriate quality of life tools for this population need to be developed.

1. Introduction

Critical care facilities and practice patterns in developing countries are diverse. In India, only a small proportion (<10%) of all low-cost government-run hospitals boast of properly equipped/staffed intensive care units (ICUs) [1,2]. Likewise, in China, where the mean annual income in rural areas is US $697 (cost for a patient with severe sepsis is $502), the government covers only about 20% of health care costs, making critical care beyond the reach of a large majority [3]. Therefore, major contributors of critical care services in these countries, albeit at a higher cost to the patient, are the private tertiary care hospital ICUs. As per statistics published from the World Health Organization, 39 million additional Indian people fall into poverty every year as a result of health care–related expenditures [4,5].

To add to the issues of limited critical care beds and resources, the proportion of geriatric patients in the ICU is gradually increasing across the world [6]. With this, the requirement for ICU beds, facilities, and resources is postulated to increase [7,8]. There has been an explosion of research in the Western world in the area of geriatric critical care, most commonly looking at the factors affecting short-term and long-term mortality and quality of life of survivors. In a recent review of literature, the authors have analyzed 21 separate studies spanning for about 30 years; of these, 5 are from the United States, 1 from Canada, 1 from Australia, 1 from the United Kingdom, and the remaining 13 from Europe [9]. Unfortunately, most of the conclusions of these studies may not be applicable in developing economies. There is a need for greater data from developing countries to understand problems unique to them. This may be particularly useful in developing future strategies to achieve better use of limited resources [2].

We hypothesized that among factors known to affect the outcome of critically ill geriatric patients, socioeconomic and premorbid

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* Corresponding author. Tel.: +91 8763400534 (mobile).
E-mail address: tripathyswagata@gmail.com (S. Tripathy).

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nutritional status may uniquely affect the outcomes in our patient population. We prospectively evaluated elderly critically ill patients (>65 years of age) admitted to the ICU of a university-level referral hospital in Eastern India for 1 year. The main outcome measures were survival and functional status. The primary objective of this study was to gather the demographics of the cohort and to determine the factors associated with short-term (28 days) and long-term (1-year follow-up) mortality. We also aimed to collect information on the functional outcome and quality of life of the survivors of ICU care at the end of 1 year.

2. Material and methods

2.1. Patient selection

This is a prospective cohort study of all patients older than 65 years admitted consecutively to a 12-bedded mixed medical surgical ICU of a tertiary care hospital. The hospital is attached to a privately funded university-affiliated medical college. The average annual patient admission rate to the ICU is greater than 700, and the average length of stay is 3.5 days, with a nurse to patient ratio of 1:1 for ventilated and 1:2-3 for nonventilated patients. A certified intensivist provides coverage to the ICU at all times. The ICU caters to all types of patients, except for postcardiac and neurosurgery patients.

Based on the available data of geriatric admissions to the ICU over the previous years and feasibility of long-term follow-up, recruitment was done for a predefined period from February 2011 to January 2012. A minimum follow-up of 1 year was a prerequisite to be included. Patients opting for care limitation/withdrawal within 24 hours, admitted after elective surgery for less than 24 hours, and admitted after cardiac arrest were excluded. After approval by the hospital ethical committee and review board, the patient or a close family member gave consent to participate in the study.

2.2. Data collection

At admission, the data collected included age (the closest estimate possible was taken in cases where age proof was unavailable), sex, diagnosis, Acute Physiology and Chronic Health Evaluation (APACHE) II score, socioeconomic status of main supporting family member (by the socioeconomic classification [SEC]), malnutrition screening score (Malnutrition Universal Screening Tool [MUST] score), activities of daily living (ADL) index prior to acute illness, and delirium scoring by the Intensive Care Delirium Screening Checklist (ICDSC). Length of stay, institution of mechanical ventilation, survival at discharge from the ICU/hospital, and incidence of patients who had to be discharged home against medical advice (DAMA) were also noted.

At least 2 telephone numbers (1 mobile and 1 landline) and 1 permanent postal address were recorded for each patient. The closest relative/guardian was provided with contact numbers for the ICU. Telephonic contact was made at day 28, followed by 3, 6, and 12 months after discharge from the hospital. A questionnaire designed to measure functional capacity by Katz ADL was administered at 12 months to the survivors. An attempt was made to assess quality of life with a questionnaire based on the modified Perceived Quality of Life score but abandoned after the initial 10 patients because of lack of adequate response. Both these questionnaires had been translated to the local vernacular by a translator and tested for linguistic equivalence.

2.2.1. Malnutrition screening

Screening was done in accordance to the MUST protocol by staff trained in such. Patients were weighed by a few trained members of the nursing staff. The ICU has its own set of scales, which are calibrated annually or sooner if needed, by an external agent. Patients were asked to recall their height or were measured by the admitting nurse using a free-standing measuring rod. In patients who were unable to stand or be weighed, height and weight were estimated using ulnar length measurements, as described in the MUST methodology. On admission, patients or relatives were asked to report any unplanned weight loss. Using these data, MUST score was calculated by the admitting nurse, as part of normal admissions procedure. Each patient was categorized into low-, medium-, or high-risk group of malnutrition by the investigator.

2.2.2. Socioeconomic classification

The SEC classification [10] was selected by the authors after discussion with experts and modified to best serve the needs of the present study. The population was divided into 5 categories (1-3 urban and 4-5 rural) (Appendix 1).

2.2.3. Delirium assessment

Delirium was assessed within first 24 hours of admission and during the length of ICU stay by the ICDSC, which is a bedside screening tool for delirium in the ICU setting; the ICDSC has been previously validated in the Indian ICU population by George et al [11].

The Index of Independent Activities of Daily Living was developed to measure the physical functioning of elderly and chronically ill patients and has been used more often than other such instruments to assess health status prior to ICU admission [12]. It was used to compare preadmission and long-term functional status. Low Katz scores were taken as poor functional status ((≤ 3) and as good functional status (>4) for ease of analysis.

2.2.4. Definitions

The elderly (>65 years) patients were divided into 2 groups: Group I (age 65-74 years) and group II (age >75 years). *Short-term mortality* was defined as death within 28 days after ICU discharge. *Long-term mortality* was defined as mortality up to 12 months after discharge from hospital.

2.3. Statistical analysis

Data were stored in Microsoft Excel format and transferred to SPSS v21 for analysis (SPSS, Chicago, Ill). A follow-up period more than 1 year was chosen to ensure that enough deaths would have occurred for meaningful statistical analysis. For continuous variables paired or unpaired t tests were used to compare differences between groups, whereas the χ^2 and Fisher exact tests were used to compare dichotomous variables. The factors showing an association with short-term and long-term mortality ($\alpha < .1$) on univariate analysis were included in a logistic regression model. Kaplan-Meier plots were used to compare mortality among the 2 age groups (groups I and II) and the low, medium, and high nutrition risk groups. These strata were then compared using log-rank tests. Because almost all variables followed a normal distribution, variables were expressed as mean $\pm$ SD. For calculating the cumulative mortality, patients who were lost to follow-up were treated as "alive" and were censored in the survival statistics applied.

3. Results

3.1. Demographic and ICU data

A total of 215 patients were screened, of which 109 were eligible for inclusion (Fig. 1).