Factors associated with discharge from the elderly hospitalized in an intensive care unit

Fatores associados à alta de idosos internados em uma Unidade de Terapia Intensiva Referência

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ABSTRACT
This study aimed to analyze factors associated with discharge from the elderly in an Intensive Care Unit of a university hospital. A retrospective cohort was performed, the data collected through the Management Application for University Hospitals. Elderly people aged over 60 years, of both sexes were included and data that found discharge or death in less than 24 hours of hospitalization were excluded. Pearson's chi-square test was used for statistical analysis, considering $p < 0.05$ and the odds ratio with a 95% confidence interval. The research revealed that Education less than or equal to eight years, type of hospitalization being surgical, and length of stay less than or equal to seven days presented higher chances of discharge with statistical significance ($p < 0.04$; $p < 0.001$; $p < 0.001$, respectively). Therefore, Education, type of admission to surgery and length of stay less than or equal to seven days were associated with a better prognosis for the elderly.
Keywords: Aged. Intensive Care Unit. Prognosis.

RESUMO
O objetivo deste estudo foi analisar os fatores associados à alta de idosos em uma Unidade de Terapia Intensiva de um hospital universitário. Foi realizada uma coorte retrospectiva, e a coleta dos dados ocorreu por meio do Aplicativo de Gestão para Hospitais Universitários. Foram incluídos idosos com idade igual ou superior a 60 anos, de ambos os sexos, e excluídos dados que constataram alta ou óbito em menos de 24 horas de internação. Na análise estatística foi utilizado o teste de Qui-quadrado de Pearson considerando $p < 0,05$ e o *odds ratio* com intervalo de confiança de 95%. Verificou-se que a escolaridade igual ou inferior a oito anos, o tipo de internação ser cirúrgica e o tempo de internação menor ou igual a sete dias apresentaram maiores chances de alta com significância estatística ($p < 0,04$; $p < 0,001$; $p < 0,001$, respectivamente). Portanto, a escolaridade, o tipo de admissão cirurgia e o tempo de internação menor ou igual a sete dias estiveram associados ao melhor prognóstico de idoso.
Palavras-chave: Fatores prognósticos. Idosos. Unidade de Terapia Intensiva.

INTRODUCTION

Technological advances in the health field have led to a significant increase in life expectancy. Worldwide, the proportion of people aged 60 and over is growing faster than that of any other age group - the same has been happening in Brazil; however, such growth is taking place without adequate preparation to deal with this population[1].

Demographic changes caused by the aging process of people bring new challenges to society, and the increased life expectancy, associated with the increase in the number of elderly people, increases the number of hospitalizations in the Intensive Care Units (ICU)[2]. The number of these patients admitted there is considerably high, being more than 45% of total admissions[3].

Studies show that currently about 60% of the ICU beds are occupied by patients over 65 years[4] and that, in patients over 75 years of age, the daily costs per ICU are approximately seven times higher when compared to those under the age of 65 years[1]. However, the growing number of elderly people in Brazil does not keep up with the increase in beds available for adults: according to the Brazilian Intensive Care Association (Amib), the ideal would be 1 to 3 ICU beds for every 10,000 inhabitants, however the number in 2017 was around 6.8 per 100 thousand inhabitants - corresponding to nearly 0.7 ICU beds per 10,000 inhabitants and, therefore, much lower than that recommended by Amib[5].

Given the above, it is important to ask: if the factors related to the discharge of elderly people hospitalized in the ICU are identified, will the hospitalization time of these patients be reduced? The question is justified, since these people who are in this situation, especially those in serious condition, tend to stay hospitalized for a longer time, which can bring about several risks, especially because they are more susceptible to complications that can affect their functional ability, an important health marker in the elderly. Thus, they tend to occupy a bed for a longer time, resulting in a decrease in supply and higher costs for public money[6].

Analyzing the above, it became necessary to conduct a study to investigate the factors associated with the discharge of elderly people admitted to an ICU of a university hospital in the North Region.

METHODOLOGY

A retrospective cohort was carried out with medical records of the elderly admitted to the ICU of the university hospital of reference in infectious and parasitic diseases, located in the State of Pará, from January 1, 2015 to December 31, 2017. The documents of the individuals aged 60 years or older in the hospitalization period, of both sexes, who were admitted to the ICU during the time frame of the research were included. Medical records that found discharge or death in less than 24 hours of hospitalization in this unit were excluded - as the Hospitalization Authorization (AIH) in the ICU is not generated in SUS records, which mischaracterizes hospitalization in the sector - and individuals with incomplete data or missing.

The data were obtained from the authors' own collection form for standardization of information, in which sociodemographic and clinical variables were analyzed on admission, as well as the outcome of hospitalization in the studied place. Patients were followed from admission to discharge, transfer to ward or death. The dependent variable of the study was discharge, in which the time count was given in days of hospital stay.

For the collection of sociodemographic data and hospitalization, the Management Application Software for University Hospitals (AGHU) was used, employed in the study health unit since 2010. The objectives of the tool are to support the standardization of care and administrative practices of federal university hospitals and allow the creation of national indicators, which will facilitate the adoption of common improvement projects. The data were also collected from the sector own file. The descriptive analysis considered the demographic characteristics (age, sex, marital status, education and place of birth), the type of ICU admission (clinic or surgery), length of stay (days), hospitalization before the ICU (days) and outcome of hospitalization (discharge, ward or death). In this study, information was used regarding patients

who were discharged from the ICU in order to examine the factors associated with the outcome.

Categorical variables were described in absolute and percentage frequencies, and continuous variables, presented by means and standard deviations. Logistic regression was used to determine the factors associated with the discharge of the elderly in the ICU. Thus, in a first stage, univariate logistic regression was performed for each independent variable such as age, sex, marital status, education, place of birth, type of admission to the ICU, stay, hospitalization before the ICU and outcome of the hospitalization.

To build the multiple logistic regression models, Pearson's chi-square test was used, in which the variables with $p \leq 0.20$ in the univariate analysis were incorporated one by one into the models. The independent variables that reached $p < 0.05$ remained in the final model. Therefore, the odds ratio (OR) was calculated in the final model to estimate the odds ratio with the 95% confidence interval.

For the descriptive analysis, the Epi-Info 3.5.1 program was used. Therefore, for all calculations, a significance level of 5% was assumed, and the software used for inferential analysis was Statistical Package for the Social Science (SPSS) version 17.0.

The research was approved by the Ethics and Research Committee of the hospital under No. 2,682,632 and followed the guidelines of resolution 466/2012 that guides the conduct of research involving human beings in Brazil.

RESULTS

Three hundred and twenty-three elderly people were admitted to the ICU of the hospital between 2015 and 2017; of this total, 11 were excluded, as their hospitalizations lasted less than 24 hours. Three hundred and twelve elderly people remained in the study, 171 of whom were discharged from the ICU, and 141 died.

The average age found among the studied elderly (n = 171) was 69.98 ± 7.79 years. Most of them were 75 years old or less, had a stable union, had less than or equal to eight years of schooling and were born in the countryside. Sociodemographic data are described in Table 1.

Table 1. Univariate analysis related to sociodemographic variables of the elderly who were discharged from ICU (n = 171)

VARIABLE	TOTAL		DISCHARGE		*p*-value[1]
	n = 312	%	n = 171	%	
Sex					
Male	143	45,8%	85	49,7%	0,130
Female	169	54,2%	86	50,3%	
Age (years)					
≤ 75	234	75%	137	80,1%	0,022
> 75	78	25%	34	19,9%	
Marital Status					
With stable union	178	57,1%	102	59,6%	0,307
Without stable union	134	42,9%	69	40,4%	
Education (years)					
≤ 8	268	85,9%	152	88,9%	0,095
> 8	44	14,1%	19	11,1%	
Origin					
Capital city	122	39,1%	62	36,3%	0,312
Countryside	171	54,8%	96	56,1%	
Other states	19	6,1%	13	7,6%	

[1] Chi-square test
Source: Created by the authors.

Regarding the clinical variables (Table 2), it was observed that 121 (70.8%) were hospitalized due to surgery, and 50 (29.2%), clinical. One hundred and forty patients (81.9%) had been in the ICU for seven days or less, while 31 (18.1%) stayed more than seven days. As for the length of stay before the ICU, 61 (35.7%) patients had a time equal to or less than 7 days, and 110 (64.3%), a time greater than seven days.

In the univariate analysis of sociodemographic (Table 1) and clinical (Table 2) variables, the following variables were statistically significant with discharge (p <0.20): female gender, age equal to or less than 75 years, education equal to or less than eight years, type of surgical admission and length of stay in the ICU equal to or less than seven days.

Table 2. Univariate analysis related to the clinical variables of the elderly admitted to the ICU (n= 171)

VARIABLE	TOTAL		DISCHARGE		*p*-value[1]
	n= 312	%	n= 171	%	
Type of admission					
Surgery	165	52,9%	121	70,8%	0,001*
Clinical	147	47,1%	50	29,2%	
Length of ICU stay (days)					
≤ 7	211	67,6	140	81,9%	0,001*
> 7	101	32,4	31	18,1%	
Hospitalization time before ICU (days)					
≤ 7	119	38,1	61	35,7%	0,323
> 7	193	61,9	110	64,3%	

[1] Chi-square test; * Statistical significance

Source: Created by the authors.

When performing multivariate regression showing the values of simple proportional risks (Table 3), patients aged 75 years or less, schooling equal to or less than eight years, type of surgical hospitalization and hospitalization time equal to or less than seven days remained in the model and were discharged from ICU.

Table 3. Multivariate logistic regression analysis of variables, age, education, type of hospitalization and length of hospitalization according to the evolution of the elderly who presented ICU discharge outcome (n = 171)

VARIABLE	(n = 171)	%	*p-value*[1]	OR[2]	CI (95%)[3]
Age (years)					
≤ 75	100	58,5%	0,022*	1	1,089-3,067
> 75	71	41,5%		1,828	
Education (years)					
≤ 8	152	88,9%	0,045*	1	1,016-4,353
> 8	19	11,1%		2,103	
Type of admission					
Surgery	121	70,8%	0,001*	1	2,575-7,204
Clinical	50	29,2%		4,307	
Length of ICU stay (days)					
≤ 7	140	81,9%	0,001*	1	1,823-5,545
> 7	31	18,1%		3,180	

[1] Chi-square test; [2] *Odds ratio*; [3] Confidence interval 95%; * Statistical significance
Source: Created by the authors.

DISCUSSION

In the present study, when multivariate regression was performed, it was observed that the factors associated with the discharge of the elderly hospitalized in the ICU were age equal to or less than 75 years, education level equal to or less than eight years, surgical-type hospitalization and length of hospital stay of seven days or less.

The total population (discharge and death) had an average age of 70.77 (± 8.17) years, and the studied population, equal to or less than 75 years, showing a predominance of younger elderly people. Studies indicate that advanced age, although not a single factor that influences decisions, is directly associated with increased death and low functionality after discharge from the ICU[7]. Souza-Muñoz et al.[8] report that age is an important risk factor for mortality, since the longer one lives, the greater the chances of dying. Such explanations demonstrate coherence with the data found in this research, in which the elderly who were most discharged were young elderly people, corroborating the evidence present in other studies [1,4,6,9].

Patients with education equal to or less than eight years showed an association with discharge outcome. This fact may be related to the public assisted by the hospital in question, which is part of the public health system and its main users are low-income people. Rosa et al.[10] claim that elderly people with higher education are linked to higher income, better housing conditions and access to health and, therefore, greater participation in the private health network.

In this study, it was found that surgical admission was directly related to discharge from the ICU with statistical significance. The occurrence of this finding may be related to the type of surgery, since patients admitted to the ICU underwent elective surgeries, and in the case of those admitted with a clinical diagnosis, the procedure was usually urgent, due to the decompensation of the condition by the severity of the acute disease, leading to worse prognosis rates. Koury et al.[11], regarding the risk factors associated with mortality, observed that patients undergoing elective or emergency surgery presented 68.2% discharge in relation to acute clinical disease (55.8%). Thus, these findings corroborate the present study.

A hospital stay of seven days or less was directly related to discharge from the ICU. The reason for this outcome may be associated with shorter hospital stay, in which the elderly were exposed to a lower risk of developing the frequent adverse effects in the ICU, since the prolonged stay implies a longer time of invasive mechanical ventilation and effects of immobilism[12]. Bed immobilization leads to atrophy and decreased muscle mass, reduced strength (about 4% to 5% of peripheral muscle per week), and this is a common factor acquired in the ICU[13,14]. Immobility can also compromise several organs and systems (musculoskeletal, gastrointestinal, urinary, cardiovascular, respiratory and skin), causing significant limitation, loss of innervation and decline in muscle mass. All of these associated factors contribute to a prolonged stay in the ICU, resulting in greater risks for complications, increased mortality rates and higher hospital costs[15].

CONCLUSION

This study highlights the importance of knowing the predictive factors related to the discharge of elderly people admitted to intensive care units. This can ensure greater planning and implementation of strategies for health professionals and managers, decrease the length of stay of these patients in intensive support, reduce costs and ensure greater quality of care. In addition, it encourages research with this population for the use of scientific evidence in the daily lives of health professionals.   The results obtained are also important to support the treatment of the elderly admitted to the ICU in order to provide shorter hospital stays, resulting in a decrease in the deaths of these people in intensive care units.

The limitation of the research was the difficulty in obtaining the medical records of patients admitted to the ICU, since the hospital does not have an electronic medical record system, thus hampering data collection. Due to this factor, it was not possible to analyze whether the elderly were submitted to the use of invasive mechanical ventilation, Glasgow at the time of admission, as well as the use of vasoactive and sedative drugs. Therefore, it is necessary that further studies are carried out to assess the success factors for the discharge of elderly people in the ICU taking into account the clinical variables of hospitalization.

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