



Expenditure on hospitalization of the elderly in intensive care units in private hospitals in a capital of the Brazilian northeast

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Abstract

Objective: Analyze the association between demographic variables, morbidity and relative to the conditions of hospitalization with the expenses resulting from the admission of elderly people in intensive care units (ICU) of private hospitals in a capital of northeastern Brazil. **Method:** This is an epidemiological, analytical and sectional study, with a quantitative approach, in which data were collected regarding 312 hospitalizations of elderly people in the ICU of all private hospitals in Natal (RN), Brazil. The dependent variable was the cost of hospitalization and the independent variables related to the characterization of individuals in terms of socio-demographic profile, morbid condition and characteristics of hospitalization. Data were analyzed using descriptive statistics, Chi-square test, t test and multiple logistic regression with prevalence ratios (PR). **Results:** The average cost per hospitalization was R\$ 4.266,05±3.322,50 for the low cost group and R\$ 39.753,162±4.929,12 for the high cost group. It was found that hospitalization due to clinical (PR=1,81; 95%CI=1,06-3,09) and respiratory conditions (PR=2,48; 95%CI=1,48-5,24), the need for mechanical ventilation (PR=2,33; 95%CI=1,43-3,78) and complete or partial disorientation at the time of admission (PR=1,81; 95%CI=1,15-2,84) were associated with higher expenditure on hospitalizations in the multiple statistical model. **Conclusion:** The knowledge produced by the study may serve as a subsidy for the implementation of actions capable of promoting better health conditions for the elderly, reducing expenses related to their hospitalization in highly specialized sectors. In addition, the research raises evidence that the construction of protocols and lines of care guiding the work process in the intensive care sector, specifically created for the elderly, may be relevant in reducing the expenses resulting from hospitalization of the elderly.

Keywords: Intensive Care Units. Health of the Elderly. Health Expenditures.

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INTRODUCTION

In most units of the federation, the gradual and proportional increase in the number of elderly people has been consolidated and brought significant social demands, also related to the change in the epidemiological profile resulting from the population aging. Such changes are associated with the advances in quality of life achieved by the population, however, on the other hand, they also imply social and economic consequences to some extent predictable, but that Brazilian states are not yet fully prepared to face them^{1,2}.

Due to demographic and epidemiological transitions, there has been an increase in the demand for health services. This perspective stems from the fact that the elderly have multiple chronic pathologies, require long-term care, have a higher frequency of hospital admissions when compared to other age groups, in addition to needing continuous interventions and being associated with a greater demand for beds in the Intensive Care Unit (ICU)^{3,4}. It appears that 42% to 52% of ICU admissions are for the elderly, who consume about 60% of the daily rates available⁴.

From the point of view of the budgetary impact, the increased demand for health services and medical-technological development promote the expansion of financial expenditures in health. When analyzing the costs per hospitalization according to the age profile of the population, a greater proportional expenditure is identified among the elderly in relation to younger patients⁵.

The magnitude of this difference was evidenced in a nationwide study, which analyzed hospitalization expenditures between the years 2002 and 2011 and shows an eight-fold higher hospitalization spending ratio in the elderly male population in relation to the adult age group, and 2.5 times more expensive when comparing elderly women over 80 with adult women⁵. As a result, the debate on health spending and efficiency in resource allocation has been playing an important role in the discussion of public policies related to the financing of health services, in view of the aging population⁶.

In Brazil, there is a total of 45,848 adult ICU beds, 23,004 of which belong to the private sector⁷. Considering the total number of adult ICU beds and their per capita distribution in the Brazilian macro-regions, it is observed that the Southeast has the highest absolute number of beds and also the best per capita distribution, while the North region has the lowest number of beds and the worst inhabitants / bed ratio. In turn, the Northeast region has the second largest number of beds for intensive adult care, but it has the second worst relationship between inhabitants and available beds⁸.

While the Unified Health System (SUS) seeks to distribute its ICU beds according to a regionalized and hierarchical health care network, in an attempt to respond to population demands, the private hospital sector does not act in a complementary way to SUS, as provided in the organic health laws, installing them where the population has financial conditions to afford the service. In addition, the segment offers intensive care in an unregulated manner, characterized by the multiplication of diagnostic and therapeutic acts, which is advantageous for service providers, but often does not bring real benefits to hospitalized patients⁹.

A research of systematic literature review, carried out in the health databases, shows a greater volume of publications on the elderly with a focus on the themes of chronic diseases, geriatric syndromes, education and the prevention of aging in its biological aspect¹⁰. In fact, there is a shortage in the production of knowledge that seeks to understand the factors that permeate the aging population and the increase in health expenditures, especially when it comes to the private hospital system, as a complement to SUS, and that, therefore, needs to face the defence of the public health system in Brazil.

In addition, the object of study of this research materializes in the space of the determinants of health / life conditions of the elderly hospitalized in ICU, as well as, in the scope of the knowledge of the multiple facets of old age and the process of aging in Natal, capital of Rio Grande do Norte. This circumscribes a gap in the field of geriatric research that implies a fragility for care, since the health needs of a population group are directly related to their

social, demographic, economic characteristics and to the morbidity and mortality of individuals, as well as to the financial and operational capacity to meet these demands¹¹.

In this context, this work is included among the proposals that articulate with a necessary challenge to Public Health and the elderly in Brazil: to collaborate in budgetary discussions so that the allocation of health resources starts from the critique on the social and epidemiological reality, so they can, in the end, materialize in health actions consistent with an ethical and fair society, especially with regard to the quality of life and constitutional rights of the Brazilian elderly.

Given this perspective, the objective of the research was to analyze the association between demographic variables, morbidity and relative to the conditions of hospitalization with the expenses resulting from the admission of elderly people to the ICU of private hospitals in a capital of northeastern Brazil.

METHOD

This is an epidemiological, observational, analytical and sectional research, with a quantitative approach, carried out in the city of Natal, capital of Rio Grande do Norte. Demographic data showed that, in the past decade, 10% of the municipality's

803,739 inhabitants were elderly. In addition, the low coverage offered by primary health care services in the municipality contrasts with the growth of an elderly population in need and with difficulty in accessing services at all levels of complexity.¹².

The dependent variable of the study was the cost in Brazilian Real (R\$) resulting from the elderly being admitted to the ICU. This data was initially expressed by a quantitative value, taken from the audited medical record invoice. This value refers only to what was assessed as an expense resulting from the elderly hospitalization in the ICU, disregarding the procedures charged in the hospitalization bill of other units of the Hospital.

In turn, the independent variables were divided into three groups (Chart 1): related to the characterization of individuals in terms of sociodemographic profile; referring to the morbid condition; and related to the characteristics of hospitalization. This information was obtained from medical records, more specifically from clinical records made by the medical and nursing staff.

In addition to the variables shown in the table above, information was collected on religion, ethnicity, income, marital status and occupation of the elderly. However, they presented a loss percentage >90%, due to the lack of filling in the medical records and were excluded so as not to harm the sample and the analyzes.

Chart 1. Summary chart of study variables. Natal (RN), 2019.

Spheres	Variables	Unit of measure and categories
Sociodemographic	Gender Age Age categorized Place of residence	Male Female Full years of life 60 to 79 years / 80 or more Metropolitan / Interior Region
Morbid condition	Main diagnosis pointed out as a reason for hospitalization Chronic diseases previously diagnosed Vulnerable elderly	Name of disease / condition Comorbidity + Disease Name Yes/No
Hospitalization	Length of hospital stay Categorized length of stay ICU daily rate Type of ICU Bed Reason for ICU admission Outcome of Hospitalization Total cost of ICU stay	Full days (24 hours) 1 to 9 days / 10 days or more Daily rate in Real Type I / II / III Clinical cause / Surgical recovery Discharge / Death Expenses in Real

Source: Prepared by the author, 2019.

The categorization of the age variable was based on the definition of long-lived elderly (≥ 80 years). The place of residence was divided between those who live in the capital and the metropolitan region and the elderly coming from the interior, as normally those who are transferred from their cities to Natal (RN) have conditions that demand complex therapeutic needs that health services in small towns lack the capacity to respond.

The length of stay was divided based on statistical criteria, which showed that the two groups behaved differently for different outcomes, such as a higher percentage of deaths in hospitalizations with 10 or more days, for example. The types of ICU beds are the same as those standardized by the Ministry of Health from Ordinance No. 3,432, of August 12, 1998. According to this legislation, ICU beds are classified into types I, II and III, in order of complexity and ascending daily price, according to the list of inputs, professionals and technologies available in the sector¹³. Finally, the elderly with significant cognitive deficits and / or with moderate or severe degrees of functional disability were classified as vulnerable.

To be included as a participant, it was necessary to be aged ≥ 60 years in the period of hospitalization, to have been admitted between the 1st of November 2013 and the 31st of January 2014 in the ICU of the participating institutions and to have hospitalizations paid for by users / families or by health plans. Of the 335 medical records evaluated, 23 were excluded because they were damaged or illegible. In view of these criteria, data were collected referring to 312 hospitalizations of elderly people in adult ICU beds from all five private hospitals in Natal (RN), which offer this service through a total of 54 ICU beds.

The time frame was chosen based on a pilot study, carried out in October 2013, as a way to previously dimension an estimate of cases that was consistent in relation to the objectives and methods of the study, theoretical prerequisites to be observed during the determination process of the time frame in sectional studies with a budget focus¹⁴.

The collected data were treated using descriptive statistics and tables of absolute and percentage frequency.

The dependent variable was dichotomized by the 75 percentile (R \$ 13,761.40), the values above that percentile were considered as a high-cost hospitalization. The categorical independent variables were submitted to the chi-square test and the quantitative ones were submitted to the Student's t test, with the dependent variable as a reference. The use of parametric tests was supported by the normal distribution of the data, assessed by the Kolmogorov-Smirnov test, where non-significant values ($p > 0.05$) indicate Gaussian distribution.

The variables that presented $p \leq 0.20$ were pre-selected to compose the multiple logistic regression model. In the model built by the variable insertion method (stepwise), the Odds Ratio (OR) values and their 95% confidence interval (95% CI) were transformed into Prevalence Ratio (PR) due to the study design. Sectional studies with a dichotomous outcome usually prioritize obtaining PR using Poisson, Cox and log-binomial regression methods. The main justification presented is that OR, obtained by the logistic regression method, overestimates the effects of variables on the outcome, especially in high prevalence events¹⁵. In order to reduce this type of bias and avoid inflated analyzes, it was obtained, through statistical formulas, the measurement of PR and its confidence intervals.

Before the field phase and the application of instruments for data collection, the research project was forwarded to the Research Ethics Committee CEP-HUOL, in accordance with the guidelines of resolution 466/12 that guides the conduct of research involving human beings in Brazil. The research project was approved by CEP-HUOL with CAAE N° 20578913.1.0000.5292.

RESULTS

Table 1 shows the sample characterization based on some sociodemographic variables and referring to the individuals' own hospitalization, in addition to a bivariate test of statistical association with the dependent variable.

Table 2 presents descriptive data for the independent variables and their bivariate analysis,

depending on the cost of ICU admission. It was possible to observe that the 312 hospitalizations resulted in an average expenditure of R \$ 13,137.95 with a standard deviation of R \$ 2,225.19 and 95% CI (15,363.13-10,912.76).

Table 3 shows the independent variables with an important association ($p < 0.20$) with the dependent variable. The age variable, in its quantitative form, was not significant to enter the multiple model. In addition, the length of stay and the ICU daily rate were also excluded from the final model, as they are components of the formula that calculates all the expenditure spent and, if included, would account for the entire variance of the dependent variable.

Table 4 shows the final multiple logistic regression model. The following variables did not show $p < 0.20$: acute myocardial infarction, angina, non-specific infectious conditions, hypertension, diabetes, heart disease, kidney disease, more than

three chronic diseases, long-lived elderly and a history of smoking.

The regression model for hospitalizations in the private network presented four significant variables. As for the analysis of residues, there were five cases with residue values greater than 2 and a Hosmer and Lemeshow test of 0.82. From a statistical point of view, that of this test is not significant ($p > 0.05$) already indicates adjustment in the model. However, the closer to 1, the better the final adjustment is. Another criterion used to demonstrate the quality of the modeling is the analysis of residues that have values above 2. This highlights the cases that do not fit the precepts indicated in the model. What is expected is that the number of cases in this situation does not exceed 10% of the sample value¹⁶. Still in order to maintain an appropriate adjustment, all variables in the model were tested for collinearity and there was no significant association that could overestimate any of the values presented.

Table 1. Descriptive and bivariate analysis of sociodemographic and hospitalization variables. Natal (RN), 2019.

Variables	n (%)	Cost		p (χ^2)
		High n (%)	Low n (%)	
Gender				
Male	149 (47.8)	40 (51.3)	109 (46.6)	0.47
Female	163 (52.2)	38 (48.7)	125 (53.4)	
Age (years)				
Between 60 and 79	198 (63.5)	47 (60.3)	151 (64.5)	0.49
80 or more	114 (36.5)	31 (39.7)	83 (35.5)	
Residence				
Metropolitan region	290 (92.9)	73 (93.6)	217 (92.7)	0.79
Interior	22 (7.1)	5 (6.4)	17 (7.3)	
Length of Hospitalization (days)				
1 to 9	249 (79.8)	17 (21.8)	232 (99.1)	<0.001
10 or more	63 (20.2)	61 (68.2)	2 (0.9)	
Outcome				
Discharge	247 (79.2)	45 (57.7)	202 (86.3)	<0.001
Death	65 (20.8)	33 (42.3)	32 (13.7)	
Type of ICU bed				
I	110 (22.3)	18 (23.1)	92 (39.3)	<0.009
II	202 (64.2)	60 (76.9)	142 (60.7)	
III*	0 (0.0)	0 (0)	0 (0)	

Data collected for research, 2019.

*There were no type III beds registered during the data collection period.

Table 2. Descriptive and bivariate analysis of the study's quantitative variables. Natal (RN), 2019.

Variables	N	Average	Standard deviation	<i>p</i> value*
Age (years)				
High cost	78	76.21	9.83	0.58
Low cost	234	74.89	10.18	
Length of hospital stay (days)				
High cost	78	16.96	10.35	<0.001
Low cost	234	2.83	2.14	
ICU daily rate (R\$)				
High cost	78	620.21	115.39	0.04
Low cost	234	624.75	134.67	
Expenditure on ICU admission (R\$)				
High cost	78	39,753.16	24,929.12	<0.001
Low cost	234	4,266.05	3,322.50	

Source: Data collected for research, 2019.

*Student's *t* test.

Table 3. Variables selected for the multiple logistic regression analysis of intensive care admissions by the significance of the chi-square test. Natal (RN), 2019.

Variable		Low cost (%)	High cost (%)	PR* (95%CI)**	<i>p</i> (χ^2)
Pneumonia	No	216 (80.0)	54 (20.0)	2.85 (1.92 - 4.25)	<0.001
	Yes	18 (42.9)	24 (57.1)		
Mechanical ventilation	No	202 (79.2)	53 (20.8)	2.11 (1.41 - 3.15)	<0.001
	Yes	32 (56.1)	23 (43.9)		
Respiratory disease	No	185 (80.8)	44 (19.2)	2.13 (1.15 - 3.12)	<0.001
	Yes	49 (59.0)	34 (41.0)		
Unconscious	No	200 (79.4)	52 (20.6)	2.10 (1.41 - 3.13)	<0.001
	Yes	34 (56.7)	26 (43.3)		
Vulnerable	No	170 (80.6)	41 (19.4)	1.89 (1.29 - 2.75)	0.001
	Yes	64 (63.4)	37 (36.6)		
Sepsis	No	218 (77.9)	62 (22.1)	2.26 (1.42 - 3.59)	0.001
	Yes	16 (50.0)	16 (50.0)		
Hospitalization for clinical reason	No	93 (85.3)	16 (14.7)	2.07 (1.30 - 3.30)	0.002
	Yes	141 (69.5)	62 (30.5)		
Disoriented	No	187 (78.2)	52 (21.8)	1.63 (1.09 - 2.44)	0.017
	Yes	47 (64.4)	26 (35.6)		
Previous Stroke	No	205 (77.1)	61 (22.9)	1.61 (1.02 - 2.57)	0.043
	Yes	29 (63.0)	17 (37.0)		
Bedridden at home	No	201 (77.0)	60 (23.0)	1.53 (0.97 - 2.41)	0.063
	Yes	33 (64.7)	18 (35.3)		
Dementia Syndrome	No	205 (76.8)	62 (23.3)	1.53 (0.95 - 2.44)	0.077
	Yes	29 (64.4)	16 (35.6)		
Congestive heart failure	No	214 (76.4)	66 (23.6)	1.59 (0.93 - 2.70)	0.085
	Yes	20 (62.5)	12 (37.5)		
Cancer	No	199 (76.5)	61 (23.5)	1.39 (0.88 - 2.20)	0.161
	Yes	35 (67.3)	17 (32.7)		

Source: Data collected for research, 2019.

*Prevalence ratio; **95% Confidence Interval.

Table 4. Multiple Logistic Regression Model of hospitalizations in the private intensive care network^a. Natal (RN), 2019.

Variables in the equation	B*	S.E.**	Wald	Df***	Sig ^b	PR ^c (95%CI) ^d
Respiratory disease	0.732	0.306	5.728	1	0.017	2.48 (1.48 - 5.24)
Mechanical ventilation	1.160	0.341	11.555	1	0.001	2.33 (1.43 - 3.78)
Hospitalization for clinical reason	0.724	0.332	4.748	1	0.029	1.81 (1.06 - 3.09)
Disoriented	0.801	0.314	6.488	1	0.011	1.81 (1.15 - 2.84)

Source: Data collected for research, 2019.

DISCUSSION

The most frequent diagnoses among the elderly hospitalized in intensive care were due to diseases related to the circulatory and respiratory systems, in addition to hypertensive crises. As for comorbidities, it is worth noting that most elderly people had three or more chronic diseases at the time of admission, the most common being hypertension, diabetes and heart problems. Nogueira et al.¹⁷ and Fuchs et al.¹⁸ found in their studies similar clinical profiles of elderly patients admitted to the ICU, with a high prevalence of respiratory and cardiovascular problems among the causes of hospitalization and a high percentage of chronic diseases secondary to the main diagnosis.

It is perceived that, in order to achieve better health conditions for these individuals, reduce the complications resulting from diseases that are sensitive to Primary Health Care (PHC), such as chronic diseases, maximize their quality of life and, consequently, reduce spending on hospitalizations in ICU, it would be important to consider the implementation of a longitudinal care management proposal for the elderly in high, medium and low complexity services. Thus, strategies for health promotion and disease prevention aimed at the elderly need to be thought of in a broad program, organized in hierarchical levels, with guarantee of interprofessional and comprehensive assistance, in which actions are thought of individually, considering the particularities of each individual¹⁹.

It was possible to notice that the age between 60 and 79 or ≥ 80 years was not associated with a higher rate of hospitalization (Table 1). Other studies, however, recognize that hospitalization costs among long-lived elderly people were higher,

demonstrated only in a bivariate analysis.^{5,20} One of them found that the cost / inhabitant ratio increases 1.85 times in the 60 to 69 age group, 2.65 in the 70 to 79 age group and 3.05 times in the ≥ 80 age group.²⁰ This perspective demonstrates the need for further research, preferably with longitudinal designs, which can assess the variables associated with the high cost of hospitalization in the ICU, also taking into account the construction of multiple models of statistical analysis, as proposed in the present study.

One of the variables present in the multiple model of analysis of this study, as a prognosis for high cost of hospitalization, were diseases of the respiratory tract, which presented a frequency of 28% of total hospitalizations. A similar finding was identified by Piuvezam et al.²¹, demonstrating that pulmonary infections, pulmonary and extrapulmonary tuberculosis showed a positive correlation with the expenses related to hospitalization of the elderly, confirming that diseases of the respiratory system significantly burden hospitalization.

Among respiratory diseases, it was identified that 57.1% of the total cases of infectious pneumonia were considered to be of high cost (Table 3). This disease appears as one of the main respiratory pathologies that affect the elderly population, in addition to being related to high morbidity and mortality and higher hospitalization expenses for the elderly.²² Ribeiro et al.²³, in a study analyzing the expenses related to the admission of elderly people to the ICU for three pathologies, pneumonia, coronary disease and stroke, in the cities of São Paulo, Rio de Janeiro and Belo Horizonte, identified that 53.7% of the total expenditure was related to hospitalization due to pneumonia. Thus, it is possible to evidence the association between infectious pneumonia

among the elderly and the increase in spending on hospitalization of the elderly in the ICU, even in regions with different climates, as is the case in the southeast and northeast of Brazil.

The high incidence of pneumonia and its relationship with the increase in expenses in the ICU occurs even in the face of systematic vaccination of the elderly, in campaigns promoted by the federal government across the country, annually²⁴. Even in the face of this apparent contradiction, there is sufficient evidence in the scientific literature that influenza vaccination is associated with reduced mortality and lower hospitalization rates²⁵.

However, the admission of elderly people to the ICU for infectious respiratory causes must involve measures that go beyond vaccination against influenza and pneumonia. It is necessary to implement strategies for the management of chronic conditions that are more comprehensive and focused on the groups at greatest risk, such as, for example, the longest-living elderly and / or those who are bedridden. Since a significant part of these individuals have muscle weakness, inefficient cough and impaired ciliary function, favoring the accumulation of secretion in the airways and the appearance of infections in the respiratory tract²⁶.

Among hospitalizations of elderly people in the ICU, 17.6% of the individuals had a need for mechanical ventilation at the time of admission to the sector, being associated with higher hospitalization expenses in the multiple analysis. The scientific literature corroborates these findings and highlights mechanical ventilation as a factor related to a longer length of stay for the elderly in the ICU, increased mortality, higher expenses and lower cost-effectiveness ratio^{18,27-30}. Therefore, once mechanical ventilation is instituted, it is important to establish monitoring and adequate management of respiratory function to identify any complications, constantly evaluate the response to treatment and perform ventilatory weaning as soon as possible.

In addition to the issue of clinical severity, the association of mechanical ventilation with higher expenses in the private intensive care network can also find explanatory elements in the way expenses are composed. The hospitalization is invoiced

according to the number of daily stays in the ICU and, additionally, fees related to the use of artificial ventilation equipment, amounts related to the volume of oxygen and compressed air used over time, and expenses related to the need for specialized procedures, such as respiratory physiotherapy and pulmonologist evaluation.

The type of hospitalization, classified as clinical or surgical, was also associated with high expenditure in the multiple regression model. In these cases, patients who were hospitalized due to clinical conditions that had a higher expense for ICU admission. A survey of 22,710 elderly people found that patients who underwent surgical intervention remained less days in intensive care and had a lower cost of hospitalization compared to those hospitalized for clinical reasons.³¹. In addition, the study by Fuchs et al.¹⁸ highlights that the clinical hospitalization of elderly people in the ICU is associated with greater severity, loss ratio and costs, when compared to surgical interventions.

However, in order to obtain more precise measures on this data, it is necessary to work with two potential confounding variables. First of all, it would be important to compare clinical admissions with emergency and elective surgeries, separately. The hypothesis raised here is that acute and unexpected interventions may explain the greater use of resources in the ICU, regardless of the type of hospitalization, since elective surgeries are usually preceded by risk assessments that include blood, cardiovascular and respiratory aspects that allow a prior planning, which cannot be done in emergency surgeries and clinical hospitalizations.

Complete or partial disorientation at the time of admission of the elderly person was also associated with a higher expenditure on hospitalizations. This finding corroborates the results obtained by Vasilevskis et al.³², which identified, from a prospective cohort study, that disorientation is directly associated with the increase in expenses related to ICU admissions. The importance of the variable for the phenomenon studied is also confirmed by some of the main instruments used to assess the prognosis of an intensive care stay, such as the Acute Physiology and Chronic Health Evaluation (APACHE II), the Sequential Organ

Failure Assessment (SOFA) and the Logistic Organ Dysfunction System (LODS), which use the variable as a criterion in their scores³³.

Thus, the disorientation of hospitalized elderly patients is a challenge for the entire team of health professionals in a hospital. Firstly, because it is a common, highly prevalent event with which many professionals are not qualified to promote specialized care. In addition, the disorientation in the elderly makes work more stressful for the team, requires different management and a greater number of professionals available to provide due care³⁴.

In this regard, the relevance of building protocols and lines of care is perceived, taking into account the particularities of the elderly public, and the use of instruments to manage their clinical condition and assess their prognosis. For that, it is possible to use disease severity assessment tools, such as those already mentioned, APACHE II, SOFA and LODS, even though they are not created and validated specifically for the elderly.

Therefore, the creation of validated prognostic assessment tools for the elderly could improve health care provided in the ICU, the work process of intensive care professionals and, consequently, reduce hospitalization costs in the sector. It is based on the premise that properly conducting treatment and care for the elderly in intensive care, optimizing resources according to individual health needs, can directly influence the cost of hospitalization.

This narrows a knowledge gap that may be the North for further research. Therefore, it is suggested that longitudinal studies, with robust samples and that have the purpose of analyzing the increase in expenditure over the entire course of hospitalization in intensive care, depending on the use of clinical assessment instruments, may be conducted.

The limitations of the study refer mainly to its cross-sectional design, which cause and effect are measured in the same time interval, however, this

methodological approach allowed the analysis of hospitalization costs for a greater number of patients outside large more traditional urban centers of the south / southeast Brazilian axis.

CONCLUSION

The present study observed that age equal to or greater than 80 years was not associated with a higher rate of hospitalization and that a considerable part of the hospitalizations of elderly people in intensive care was caused by clinical conditions, which were mostly due to diseases related to the circulatory and respiratory systems. In addition, when analyzing the factors associated with the high cost of hospitalization of the elderly in intensive care, it was found that hospitalization due to clinical and respiratory conditions, the need for mechanical ventilation and complete or partial disorientation at the time of admission were associated with higher spending on hospitalizations.

In view of the discussions inherent to the expenses resulting from hospitalizations of elderly people in intensive care and its association with demographic factors, morbidity and relative to the conditions of hospitalization, the knowledge produced by the study may serve as a subsidy for the formulation and implementation of actions capable of promoting better health conditions for the elderly, maximize their quality of life and reduce hospitalization-related expenses in highly specialized sectors.

During the course of hospitalization, the research raises evidence that the construction of protocols and lines of care guiding the work process in the intensive care sector, specifically created for the elderly, through the use of clinical management tools and prognostic assessment, can be important in reducing expenses resulting from hospitalization of the elderly.

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