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ORIGINAL ARTICLE

ASSOCIATED FACTORS WITH HOSPITALIZATION OUTCOMES OF ELDERLY SUBMITTED TO FEMUR FRACTURE CORRECTION*

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ABSTRACT
Objective: to analyze the factors that interfere in the hospitalization outcome of elderly with femur fracture.
Method: exploratory cross-sectional study, elderly population (≥60 years) from 2015 to 2017, from northern Paraná. Bivariate analyzes of associations and frequency distribution were performed.
Results: from the 189 analyzed medical records, 132 (69.9%) elderly developed morbidities in the hospital environment. Urinary tract infection, sepsis, pneumonia, pressure injury, and the presence of two or more comorbidities were associated with death outcome and hospitalization time greater than 10 days p<0.001.
Conclusion: pre-existing and in-hospital morbidities in elderly with femur fracture increased hospitalization for more than 10 days and with death outcome. Acquired morbidities in infectious hospitalization contributed to complications and poor prognosis. It is hoped that other studies can be further developed in order to develop hospital care protocols for the elderly.

DESCRIPTORS: Femoral Fractures; Elderly; Hospitalization; Epidemiology; Morbidity.

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ARTIGO ORIGINAL / ARTÍCULO ORIGINAL

FATORES ASSOCIADOS AO DESFECHO DA HOSPITALIZAÇÃO DE IDOSOS SUBMETIDOS A CORREÇÃO DE FRATURA DE FÊMUR

RESUMO

Objetivo: analisar os fatores que interferem no desfecho de internação de idosos com fratura de fêmur.

Método: transversal exploratório documental, população de idosos (≥60 anos) no período de 2015 a 2017, do norte do Paraná. Foram realizadas análises bivariadas de associações e distribuição de frequência.

Resultados: dos 189 prontuários analisados, 132 (69,9%) idosos desenvolveram morbidades no ambiente hospitalar. A ocorrência de infecção urinária, sepse, pneumonia, lesão por pressão e a presença de duas ou mais comorbidades foram associadas ao desfecho óbito e ao tempo de hospitalização superior a 10 dias p<0,001.

Conclusão: morbidades preexistentes e hospitalares em idosos com fratura de fêmur elevaram a hospitalização pelo tempo superior a 10 dias e com desfecho de óbito. As morbidades adquiridas na hospitalização de característica infecciosa contribuíram para complicações e mau prognóstico. Espera-se que outros estudos possam ser aprofundados no intuito de desenvolver protocolos de atendimento hospitalar ao idoso.

DESCRITORES: Fraturas do Fêmur; Idoso; Hospitalização; Epidemiologia; Morbidade.

FACTORES ASOCIADOS AL RESULTADO DE HOSPITALIZACIÓN DE ANCIANOS SOMETIDOS A CORRECCIÓN DE FRACTURA DE FÉMUR

RESUMEN

Objetivo: Analizar los factores que interfieren en el resultado de la internación de ancianos con fractura de fémur.

Método: Transversal, exploratorio, documental, población de ancianos (≥60 años) entre 2015 y 2017, del norte de Paraná. Fueron aplicados análisis bivariados de asociaciones y distribución de frecuencia.

Resultados: Fueron analizadas 189 historias clínicas, 132 (69,9%) ancianos desarrollaron morbilidades en ámbito hospitalario. El hallazgo de infección urinaria, sepsis, neumonía, lesión por presión y la presencia de dos o más comorbilidades fueron asociadas al desenlace de óbito y a tiempo de hospitalización superior a 10 días p<0,001.

Conclusión: Las morbilidades preexistentes y hospitalarias en ancianos con fractura de fémur incrementaron la hospitalización por tiempo superior a 10 días, con desenlace de óbito. Las morbilidades de tipo infecciosas adquiridas durante la hospitalización derivaron en complicaciones y mala prognosis. Otros estudios podrán profundizar en el tema para desarrollar protocolos de atención hospitalaria al anciano.

DESCRIPTORES: Fracturas del Fémur; Anciano; Hospitalización; Epidemiología; Morbilidad.

INTRODUCTION

Aging is a worldwide reality, driven by the decrease in fertility rate, related to increased survival due to technological advances in medicine and improved living conditions[1]. According to data from the Brazilian Institute of Geography and Statistics (IBGE), life expectancy of Brazilians has been increasing every year[2]. Elderly number has risen from 3 million in 1960 to 7 million in 1975 in just 15 years, to 14 million in 2002, with an estimated 32 million in 2020[3].

In a time of numerous health challenges, such as climate change, emerging diseases and the ever-growing bacterial resistance to medicines, one trend is certain: aging populations are accelerating worldwide. In this regard, the World Report on Aging and Health reflects on the consequences and changes for health, service systems, their budgets and for professionals[4].

IBGE revealed that the elderly population in Londrina had a 35.2% increase over a 10-year interval[2]. In 2016 there were 295 hospitalizations due to femur fracture, with a predominant age group above 80 years, determining the incidence of 4.6/1000 inhabitants[5]. This grievance is predominantly female as more vulnerable[6-7].

Biological alterations, physical inactivity, osteoporosis, early menopause, physical disability, loss of balance and the presence of comorbidities have all contributed to the occurrence of femur fractures, nowadays considered one of the biggest public health problems, resulting in the elderly being decreased on his autonomy. Approximately one third of white women over age of 65 develop osteoporosis and 30% have one fall every year[6].

It is perceived that this is a challenging phase for the elderly in which physical and behavioral transformations are accompanied by health problems and often by chronic diseases that may be associated with lifestyle and/or cultural factors, which may affect autonomy when the elderly are victims of fractures[8].

Diseases appear as risk factors for morbidity and mortality in the elderly with fractures, and respiratory, cardiac and infectious diseases contribute to the increase in mortality rates during hospital stay[9]. Existing or acquired comorbidities number significantly influences the outcome of hospitalization in the elderly; those with three or more comorbidities are more likely to die[10].

Patients who are hospitalized with morbidities such as urinary tract infection or pneumonia have prolonged hospitalizations and a higher incidence of complications with increased death risk[11]. In an observational study of 218 elderly people, it was found that infections, delirium, thrombosis, and complications of pre-existing comorbidities (cardiac, pulmonary, and renal) occurred in 26.6% of those hospitalized for femoral fracture[12].

This study provides subsidies to guide the way of managers and health professionals, in order to improve the gaze at this vulnerable group, so that the treatment of a disease such as femur fracture does not become an insurmountable course before risk factors that may arise during hospitalization.

Considering that related studies on the subject require further study of what actually interferes with the evolution of these elderly; the rising projection in the number of elderly each decade, the high incidence of hospitalizations for femur fracture in this age group that often remains for a longer hospitalized period, and many of them progress to death; this study aims to analyze the factors that interfere in the outcome of hospitalization of elderly with femur fracture.

METHOD

This study design was characterized by an exploratory and documentary cross-sectional study in which were identified 226 medical records of elderly (≥60 years) hospitalized for femur fracture from 2015 to 2017. Inclusion criteria of this research were elderly with femur fracture identified with the ICD: S72 to S72.4.

Users who were transferred to other establishments, readmissions and medical records that presented incomplete or illegible diagnostic errors that made it impossible to obtain essential data for the study were excluded.

Research was conducted in a tertiary regional referral hospital of the Unified Health System in trauma for 250 municipalities. Collection was carried out from January to March 2018 using the Google docs "Forms" tool through online data entry, with objective and closed questions, composed of the study variables. This data was automatically organized in an Excel file for categorization and tabulation, being exported to the program Statistical Package for the Social Sciences-SPSS.

Statistical analysis comprised two stages: the first one was a descriptive analysis, by means of the distribution of categorical variable frequencies and mean (standard deviation) of continuous variables. And the second is Bivariate Analysis of the associations proposed by the multinomial linear regression test. For all analyzes the level of statistical significance of $p<0.05$ was considered in all tests.

Following variables were used: gender; age; length of stay; pre-existing morbidities: diabetes mellitus, hypertension, cardiovascular, neurological, endocrine, pulmonary and renal diseases; in addition to pathologies developed during hospitalization: pressure injury (from grade II), myocardial infarction,, delirium (characterized by record in agitation chart, altered level of consciousness and/or record of medical diagnosis), stroke, thromboembolism and infections: urinary tract, surgical site and pneumonia. Still regarding the outcome, hospital discharge and death were used.

Project was valued and approved by the Research Ethics Committee of the State University of Londrina, obtaining opinion No. 2415361 of December 5, 2017.

RESULTS

Study analyzed medical records of the elderly hospitalized between January 2015 and November 2017, with a total of 226 hospitalizations victims of femur fracture, of which 37 (16.37%) records were excluded according to the adopted criteria, 189 records were analyzed.

Table 1 shows the population studied profile, identifying that the most affected public was women aged, 116 (61.4%), ranging in age from 60 to 95 years old with an average of 77.7 years of age.

Table 1 - Sociodemographic characterization of elderly hospitalized for femur fracture in a tertiary hospital (2015–2017). Londrina, PR, Brazil, 2018 (continues)

Variables	n	%
Gender (n=189)*		
Male	73	38.6
Female	116	61.4
Age (n=189)*		

60-69 years old	35	18.5
70-79 years old	68	36
80-89 years old	74	39.2
≥ 90 years old	12	6.3
Age (tertiary) (n=189)*		
60-73 years old	62	32.8
74-82 years old	63	33.3
≥ 83 years old	64	33.9
Marital status (n=170)*		
Married	77	45.3
Single/widowed	79	46.5
Separated/divorced	14	8.2
Race/Skin Color (n=173)*		
White	162	93.7
Black	7	4
Asian	4	2.3

* Variation of "n" analyzed for each variable is due to the absence of information in the medical record.

Of the study population, 164 (86.77%) elderly people had a record of the presence or absence of pre-existing morbidity, 25 (13.22%) did not have this record in their medical records upon admission. As for the number of morbidities 39 (23.8%) reported no morbidity, 69 (42.1%) had one and 56 (34.1%) two or more comorbidities (Table 2).

Table 2 - Pre-existing morbidity present in medical records of elderly hospitalized with femur fracture in a tertiary hospital (2015–2017). Londrina, PR, Brazil, 2018 (continues)

Variables (n=164)	**n**	**%**
Hypertension		
Yes	114	69.5
No	50	30.5
Diabetes Mellitus		
Yes	48	29.3
No	116	70.7
Chronic obstructive pulmonary disease		
Yes	11	6.7
No	153	93.3
Previous infarction		
Yes	6	3.7
No	158	96.3

Denies comorbidities		
Yes	39	1.2
No	125	98.8

Regarding acquired morbidity, 132 (69.9%) of the elderly developed in-hospital morbidity compared with those who did not, and 75 (39.7%) were related to infectious processes (Table 3).

Table 3 - Distribution of the frequency of in-hospital acquired morbidity (2015–2017). Londrina, PR, Brazil, 2018

Variables (n=189)	**n**	**%**
Delirium		
Yes	57	30.2
No	132	69.8
Pneumonia		
Yes	34	18
No	155	82
Urinary infection		
Yes	30	15.9
No	159	84.1
Sepsis		
Yes	11	5.8
No	178	94.2

Table 4 shows that although there was a higher frequency of femoral neck fractures, there was no statistical association of fracture type with time longer than ten days of hospitalization, the same happened with the presence of Delirium. There was a statistical association of urinary tract infection, pneumonia, pressure injury, and the presence of two or more comorbidities with length of stay greater than 10 days.

Table 4 - Association of factors in relation to length of hospital stay 2015–2017. Londrina, PR, Brazil, 2018

Factors	**Length of stay**					
	< 10 days		**≥ 10 days**		**Total**	**"p"**
	n	**%**	**n**	**%**		
Fracture Type						0.066

Femoral neck	16	25.8	46	74.2	62	
Transtrochanteric	50	39.4	77	60.6	127	
Urinary infection						0.007
Yes	4	13.3	26	**86.7**	30	
No	62	39	97	61	159	
Pneumonia						<0.001
Yes	1	2.9	33	**97.1**	34	
No	65	41.9	90	58.1	155	
Pressure injury						0.003
Yes	2	8.3	22	**91.7**	24	
No	64	38.8	101	61.2	165	
Acquired Comorbidities						0.002
0	42	44.7	52	55.3	94	
1	21	32.8	43	67.2	64	
≥ 2	3	9.7	28	**90.3**	31	
Delirium						0.194
Yes	16	28.1	41	71.9	57	
No	50	37.9	82	62.1	132	

There was a statistical association between the occurrence of urinary tract infection, sepsis, pneumonia and pressure injury with the death outcome. Presence of more than two comorbidities was also associated with the death outcome (Table 5).

Table 5 - Factors association related to discharge and death outcome 2015–2017. Londrina, PR, Brazil, 2018 (continues)

Factors	**Discharge**		**Death**		**Total**	**"p"**
	n	**%**	**n**	**%**		
Length of stay						0.024
< 10 days	62	93.9	4	6.1	66	
≥ 10 days	101	82.1	22	**17.9**	123	
Urinary infection						0.001
Yes	20	66.7	10	**33.3**	30	
No	143	89.9	16	10.1	159	
Sepsis						<0.001
Yes	0	-	11	**100**	11	
No	163	91.6	15	8.4	178	
Pneumonia						<0.001

Yes	20	58.8	14	**41.2**	34	
No	143	92.3	12	7.7	155	
Pressure injury						<0.001
Yes	14	56	11	**44**	25	
No	149	90.9	15	9.1	164	
Acquired Comorbidities						<0.001
0	91	96.8	3	3.2	94	
1	56	87.5	8	12.5	64	
≥ 2	16	51.6	15	**48.4**	31	

DISCUSSION

This study results revealed that the presence of two or more morbidity in the elderly with femur fracture caused the death rate to be higher, which was similar to that found in another study, in which the group with the highest number of morbidities had the high death rate[13]. Emphasizing that morbidities have a major influence on the prognosis of the hospitalized elderly, something that was transparent in the study.

Number of elderly people who presented the highest amounts of morbidity was related to the age group older than 80 years, being projected for females. Associated age with a set of comorbidities also led the elderly to a high risk of death, corroborating the study regarding the number of morbidities that favors the elderly to an undesirable outcome as death[14]. Although sepsis is the leading cause of mortality, its origin was urinary tract infection and absence of aseptic technique in surgical procedures[11].

Most of the elderly have already been hospitalized with morbidities, especially hypertension followed by diabetes. In two studies involving elderly people with femur fractures, hypertension and diabetes were the most common pathologies[6,14]. In a study involving 213 elderly, it was observed that the absence of comorbidities was associated with the survival group, while those who had three or more comorbidities had the highest mortality rate[15].

These pathologies frequency may be due to the high prevalence among the elderly and their aging process, but the occurrence of fractures in the elderly with hypertension may be related to the loss of minerals through urine, especially calcium, due to the use of channel antihypertensive calcium channel blockers[6].

Delirium development presence among the elderly, was the highest among the morbidities acquired during hospitalization, but without association with length of stay. Delirium is a frequent complication among hospitalized elderly, triggered by factors such as cognitive level, disease severity, dehydration, bladder catheter use, iatrogenic event, physical restriction and association of more than three drugs[16]. In an integrative review, the presence of delirium was observed between 27% to 79% of elderly in intensive care units[17]. In this study we did not obtain a statistical association regarding the length of hospitalization.

On the other hand, drugs (opioids, benzodiazepines, corticosteroids and anticholinergics) have a major influence on the development of delirium in the elderly, reaching 88% in palliative care units[18]. Delirium definition criteria in this study may have influenced the lower frequency, because at the research site there is no protocol for

delirium identification through validated scales, which makes identification and registration in medical records difficult.

Urinary tract infection incidence was the second highlighted morbidity, followed by pneumonia, which was associated with the outcome of death in the surveyed elderly. Relationship is similar to that in a cross-sectional study, which involved 153 elderly with predominance of pneumonia and urinary infection, associated with death of elderly with femur fracture, but the study population was smaller[15].

Septic condition widespread by infectious processes is one of the most serious problems, due to the limited control of this disease. In this study, it was found that all the elderly who evolved to sepsis condition resulted in death. Elderly are already susceptible to complications and thus present a higher risk with the presence of comorbidities from the hospital environment, mainly due to respiratory infections and sepsis[19].

Considering those elderly who were hospitalized for more than ten days, it was possible to notice the presence of two or more comorbidities in this group, such as urinary tract infection, pneumonia and pressure injury event. However, delaying hospitalization is also a contributing factor to morbidity development. In a retrospective cohort study in which 81 medical records were analyzed, it was found that delayed surgical treatment led to the development of morbidities, considerably increasing hospitalization time, leading to a higher risk of nosocomial infections[20].

Need for greater care is fundamental and necessary due to the hospitalization process for surgical correction, which can lead to the acquisition of morbidities and thus prolong the period of hospitalization, resulting in the worsening of the clinical condition and a high risk of mortality. People during aging process show declining functionalities in multiple physiological systems through a biological syndrome, which may characterize vulnerability and adverse consequences such as hospitalization, institutionalization and death[21].

Surgical act is essential for elderly's quality of life after the fracture, but it is a great challenge today in health services to prevent injuries and adverse events from negatively affecting the expected results of hospitalization. When factors such as infectious conditions and pressure injuries interfere with the fractures treatment in the elderly, it is clear that health services, with their risks, need to seek ways to improve the provided care, in large and small ways, that can prevent this assistance and institutional iatrogenic.

Event reduction pursuit in health institutions has been a constant for managers, as adverse events occur when there are unplanned technical and organizational processes, which promotes risk and harm to patients[22].

Study limitation was the difficulty in handling and interpreting the physical chart, considering its arrangement in single envelopes together with various clinics without chronological order of care, as well as the need to read and reread of handwriting with not so readable spellings, which can lead to non-localization of variables.

CONCLUSION

Hospital-acquired injuries, such as infectious urinary tract processes, pneumonia, pressure injury and sepsis, considerably affected the evolution and length of hospitalization of the elderly, increasing the mortality rate, especially for those who developed septic conditions. Elderly who had two or more comorbidities were those who remained in hospital for a longer period, exceeding ten days, and were associated with the deaths that occurred.

These findings increase the importance of effective actions that can prevent adverse events and injuries, thus ensuring safer care and better prognosis for the elderly affected

by femur fracture.

In addition, there is a need for the construction of specific protocols for the elderly care in health facilities and for further research in order to prioritize this care, reducing the length of stay and thus avoiding exposure to their fragility.

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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - CA
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Final approval of the version to be published - CA, MSGD, RPR, CJAC
Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - CA