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ORIGINAL RESEARCH

Predictors of mobility impairment after hospitalization in a reference hospital among individuals with infectious diseases

Preditores de piora da mobilidade ao final da internação em hospital de referência em doenças infectocontagiosas

Predictores de empeoramiento de la movilidad al final de la hospitalización en un hospital de referencia para enfermedades infectocontagiosas

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ABSTRACT | Infectious diseases may lead to motor and functional complications, impairing the quality of life of affected individuals. Moreover, hospitalization itself is considered an important cause of functional decline in patients. In these cases, physiotherapy aims to preserve and restore the integrity of organs and functions, promoting the maintenance of range of motion, the gain of muscle strength, the training of postural changes and gait, as well as the practice of aerobic exercises and the improvement of thoracic expandability in hospitalized individuals. This study aimed to describe the epidemiological profile of patients at a reference hospital for infectious diseases and identify predictors of mobility impairment after hospitalization This is a retrospective study based on the analysis of medical records of patients hospitalized in 2016 who required physiotherapy. Data consisted of socioeconomic and clinical variables, and the predictors of mobility impairment after hospitalization were determined by descriptive statistics and binary logistic regression. Among the 638 electronic medical records of patients hospitalized from January to December 2016 who required physiotherapy, 66.6% were men with median age of 42 years and 50.8% were HIV-positive. We verified five risk factors for mobility impairment after hospitalization: age, number of previous hospitalizations, use of mechanical ventilation, HIV-infected patients, and presence of opportunistic infections. Our findings point to the importance of physiotherapy for improving functional mobility in hospitalized patients.

Keywords | Risk Factors; Mobility Limitation; Hospitalization; Infectious Diseases.

RESUMO | As doenças infectocontagiosas podem gerar complicações motoras e funcionais, prejudicando a qualidade de vida dos indivíduos acometidos. Além disso, observa-se que a própria internação hospitalar é uma causa importante de declínio funcional dos pacientes. Nesses casos, a fisioterapia visa preservar e restaurar a integralidade de órgãos e funções, promovendo a manutenção da amplitude de movimento, o ganho de força muscular, o treino de trocas posturais e de marcha, assim como a prática de exercícios aeróbios e a melhora da expansibilidade torácica de indivíduos hospitalizados. Os objetivos deste estudo foram descrever o perfil epidemiológico dos pacientes em um hospital de doenças infectocontagiosas e identificar preditores de piora motora ao final da internação. Trata-se de um estudo retrospectivo baseado na análise de prontuários de pacientes internados em 2016 que necessitaram de fisioterapia. Foram coletadas variáveis

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socioeconômicas e clínicas e realizada análise estatística descritiva e regressão logística binária para determinar os fatores preditores de piora da mobilidade ao final da internação. Foram avaliados 638 prontuários eletrônicos de pacientes internados de janeiro a dezembro de 2016 que necessitaram de fisioterapia, com prevalência do sexo masculino (66,6%) e mediana de idade de 42 anos; 50,8% dos pacientes eram portadores do vírus da imunodeficiência humana (HIV). Foram encontrados cinco fatores de risco para piora da mobilidade ao final da internação: idade, número de internações prévias, uso de ventilação mecânica, ser portador do HIV e presença de doenças oportunistas. Diante dos achados, observa-se a importância da atuação fisioterapêutica voltada para a melhora funcional em pacientes que cursam com internação hospitalar.

Descritores | Fatores de Risco; Limitação da Mobilidade; Hospitalização; Doenças Infecciosas.

RESUMEN | Las enfermedades infectocontagiosas pueden ocasionar complicaciones motoras y funcionales, perjudicando la calidad de vida de las personas afectadas. Además, se observa que la propia hospitalización es una causa importante del deterioro funcional de los pacientes. En estos casos, la fisioterapia tiene como objetivo preservar y restaurar la integralidad de órganos y funciones, promoviendo el mantenimiento de la amplitud de movimiento, la ganancia de fuerza muscular, el entrenamiento de cambios posturales y de marcha, así como la práctica de ejercicios aeróbicos y la mejora de expansión torácica de los pacientes hospitalizados. Los objetivos de este estudio fueron describir el perfil epidemiológico de los pacientes en un hospital para enfermedades infectocontagiosas, así como identificar los predictores de empeoramiento motor al final de la hospitalización. Este es un estudio retrospectivo con base en el análisis de historias clínicas de pacientes hospitalizados en 2016 que requirieron fisioterapia. Se recogieron variables socioeconómicas y clínicas y se realizó análisis estadístico descriptivo y regresión logística binaria para determinar los factores predictores de empeoramiento de la movilidad al final de la hospitalización. Se evaluaron 638 historias clínicas electrónicas de pacientes hospitalizados en el período de enero a diciembre de 2016 que requirieron fisioterapia, con prevalencia de varones (66,6%) y una mediana de edad de 42 años; el 50,8% de los pacientes tenían el virus de la inmunodeficiencia humana (VIH). Se encontraron cinco factores de riesgo de empeoramiento de la movilidad al final de la hospitalización: edad, número de hospitalizaciones previas, uso de ventilación mecánica, ser VIH positivo y presencia de enfermedades oportunistas. Los hallazgos evidencian la importancia de la fisioterapia dirigida a la mejora funcional en los pacientes hospitalizados.

Palabras clave | Factores de Riesgo; Limitación de la Movilidad; Hospitalización; Enfermedades Infecciosas.

INTRODUCTION

The increased life expectancy in Brazil, with chronic noncommunicable diseases (NCDs) being the leading cause of death and comorbidities, led the country to experience an epidemiological transition[1].

Whereas in the 1930s infectious diseases accounted for 46% of all deaths, in 1985 they represented only 7%. Conversely, deaths due to cardiovascular diseases, neoplasms, and external causes tripled throughout this period[1,2].

Despite the decline in mortality from infectious and parasitic diseases, these conditions are still responsible for a large number of deaths, sequelae, and disabilities, and thus should not be ignored or neglected[3]. Since 2009, acquired immunodeficiency syndrome (AIDS) accounts for more than 12,000 deaths per year in Brazil[4].

Many are the infectious and parasitic diseases of public health concern. These diseases can affect the respiratory, gastrointestinal, and the nervous systems, leading to functional complications and impairing the quality of life of affected individuals[5].

Besides infectious diseases, pneumonia and exacerbations of chronic diseases may also lead to functional loss during hospitalization[6]. Menezes, Oliveira and Menezes[7] verified that older adults may become debilitated regardless of the cause of hospitalization, experiencing a reduction in their mobility level. Thus, the authors reported that hospitalization, rather than the disease itself, may be the main cause of functional decline.

Physiotherapy contributes to the overall wellness of patients at both hospital and outpatient scope through preventive and rehabilitation actions. Physical therapy aims to preserve and restore the integrity of organs and functions, promoting the maintenance of range of motion, the gain of muscle strength, the training of postural changes and gait, as well as the practice of aerobic exercises and the improvement of thoracic expandability[8].

Multiprofessional treatment is particularly important for hospitalized patients, as a relationship with the healthcare team may provide patients with a better understanding of the disease and its potential harms and increase their adherence to treatment, which may lead to fewer clinical and functional complications[5].

This research was spurred by the scarcity of studies addressing the risk factors for impaired mobility in hospitalized patients, especially in hospitals for infectious disease. Thus, this study aimed to describe the epidemiological profile of patients treated at the physiotherapy service of a reference hospital for infectious diseases, assessing their mobility level and analyzing the predictors of motor impairment after hospitalization.

METHODOLOGY

This is a retrospective study conducted with data from the electronic medical records of patients. Our research design waives the obtainment of informed consent form.

Patients aged over 18 years who were admitted to the Hospital for Tropical Diseases (HTP) Dr. Anuar Auad, in Goiânia, from January to December 2016, and received physiotherapy treatment were included in this study. Patients presenting maximum motor capacity – independent ambulation – during evaluations and reassessments did not require follow-up. Patients who died before initiating the physiotherapy treatment were excluded from the survey.

The following socioeconomic variables were collected: age, gender, housing, education level, and occupation. As for clinical variables, the following data were included: hospitalization time, number of previous hospitalizations, hospitalization outcome, mobility level at admission and discharge, type of ventilation (spontaneous or mechanical) at admission and discharge, use of mechanical ventilation (MV) (in days), infection by human immunodeficiency virus (HIV), hospitalization for infectious disease, presence of opportunistic infections, and complications.

For routine mobility assessment, the Hospital physiotherapy sector uses the 5-level scale validated by Callen et al.[9], with three dependence levels (A, B and C) for each mobility level (Chart 1). According to this tool, mobility is classified as: (1) bedbound; (2) bed-to-chair with no weight-bearing; (3) bed-to-chair with partial weight-bearing; (4) assisted walking; and (5) non-assisted walking. Patients classified with mobility level from 1 to 3 do not walk, whereas those with level 4 or 5 do, even if with support[9].

Data were tabulated in the Microsoft Excel 2016 and statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 18.0. Sociodemographic and clinical characteristics of patients at admission underwent descriptive analysis. The Shapiro-Wilk test was used to verify normality for continuous variables, which were expressed as median and interquartile range. Categorical variables were expressed as frequency and percentage.

Independent variables associated with mobility impairment during hospitalization were evaluated using binary logistic regression. The following variables were included in the forward LR model: age, gender, housing, hospitalization time, number of previous hospitalizations, use of MV, days in MV, HIV-positive patient, cause of hospitalization, opportunistic infections, and complications. A p-value less than 0.05 ($p<0.05$) was considered statistically significant for the analysis.

Chart 1. Classification of mobility level

Mobility level	Bedbound	Passive bed-to-chair transfer	Active bed-to-chair transfer	Walks with assistance	Walks without assistance
	Level 1	Level 2	Level 3	Level 4	Level 5
A	Passive positioning and mobilization	Remains in "semi-bed" position	Transfer with 2 the assistance of 2 people	Walks with the assistance of 2 people	Independent mobility in the bedroom
B	Assisted positioning and mobilization	Mechanical transfer or assisted by 3 people	Transfer with the assistance of 1 person	Walks with the assistance of 1 person	Walks <20m outside the bedroom
C	Independent mobility in bed	Transfer with 2 the assistance of 2 people	Supervised by 1 person	Supervised by 1 person	Walks <20m outside the bedroom

RESULTS

We analyzed 638 electronic medical records of patients who were hospitalized from January to December 2016 and received physiotherapy treatment. Median age was 42 years, with an interquartile range of 33 to 55 years. Table 1 presents other socioeconomic variables.

Table 1. Distribution of socioeconomic variables

Variable	N	%
Gender		
Male	425	66.6
Female	213	33.4
Housing		
Urban	588	92.2
Rural	30	4.7
Supportive housing	9	1.4
Homeless	7	1.1
Prison inmate	4	0.6
Education level		
Not informed	237	37.1
Illiterate	13	2.0
Literate	9	1.4
Primary education	211	33.1
Secondary education	135	21.2
Tertiary education	33	5.2
Occupation		
Intellectual worker	17	2.7
Manual worker	61	9.6
General services	133	20.8
Agricultural services	40	6.3
Retired	78	12.2
Domestic services	111	17.4
Other	31	31.0

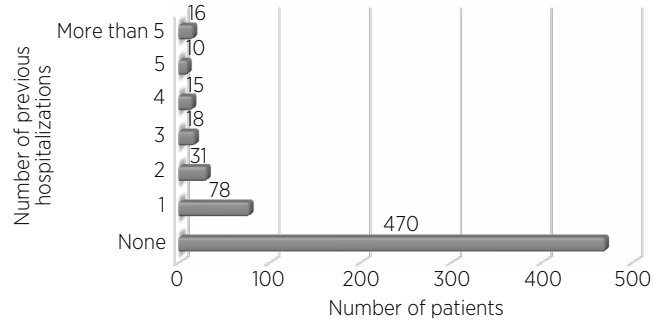
Among the evaluated patients, 324 (50.8%) were HIV-positive. Other prevalent infectious diseases among the study population were tuberculosis (11.6%), leprosy (4.2%), and viral hepatitis (2%). We also verified causes of hospitalization for non-infectious diseases, such as snakebite accidents (5.2%), dermatological diseases (4.1%), pneumonia (3.9%), and Guillain-Barré syndrome (2.9%).

Opportunistic infections occurred in 237 (37.1%) patients, and the most prevalent are described in Table 2. Hospital inpatient complications occurred in 124 (19.4%) cases, and the most frequent were acute renal failure (29.8%), sepsis (23.4%), pneumonia (18.5%), and septic shock (16.1%).

The median length of stay was 14 days, with IQR of 8-24 days, and Graph 1 describes the number of previous hospitalizations. Of the 638 analyzed hospitalizations, 441 ended up in discharge (69.1%), 160 in death (25.1%), 26 in transfer (4.1%) and 11 in evasions (1.7%).

Table 2. Main opportunistic infections

Opportunistic diseases	N	%
Toxoplasmosis	53	8.3
Moniliasis	40	6.3
Histoplasmosis	28	4.4
Syphilis	24	3.8
Cryptococcosis	18	2.8
Herpes	18	2.8



Graph 1. Number of previous hospitalizations of patients who received physiotherapy treatment in 2016 at the HTP/HAA

After respiratory assessment, 226 patients (35.4%) showed to require MV at some point during hospitalization, with mean duration of 10.3 days (ranging from 1-75 days). As for the type of MV, 74.8% required invasive ventilation, 13.7% noninvasive, and 11.5% used both types of mechanical ventilation.

According to the mobility assessment, 392 patients (61.4%) were able to walk at hospital admission and 431(67.6%) at discharge. By comparing initial and final mobility, 323 (50.6%) of the patients improved mobility by at least one dependency level, 185 (29%) maintained the mobility recorded at admission, and 130 (20.4%) reduced mobility by least one dependency level.

Variables associated with mobility impairment during hospitalization were evaluated using binary logistic regression. The results obtained through the model indicate the independent variables predictors of mobility impairment, shown in Table 3.

Table 3. Predictors of mobility impairment after hospitalization

Characteristic	B	P-value	OR	CI (95%)
Age	0.037	< 0.001	1.038	1.022-1.054
Number of previous hospitalizations	0.162	0.032	1.176	1.014-1.363
Use of MV	-	< 0.001	6.745	4.355-10.447
HIV-positive patient	-	0.043	1.746	1.018-2.993
Presence of opportunistic infections	-	0.011	1.933	1.933-3.214

B: regression coefficient; OR: odds ratio; CI: confidence interval; MV: mechanical ventilation; HIV: human immunodeficiency virus.

The variables "age" and "use of MV" were strong predictors of mobility impairment. We also verified a positive correlation between the outcome and "age" and "number of previous hospitalizations," indicating that the older the patient and the higher the number of previous hospitalizations, the greater the risk of in-hospital mobility impairment. Despite presenting the highest odds ratio (OR), data on "use of MV" showed greater variability due to the higher confidence interval (CI).

DISCUSSION

After analyzing 638 medical records, we verified that most patients hospitalized were male (66.6%), from urban areas (92.2%), with primary education (33.1%), and working with general (20.8%) and domestic services (17.4%). Half of the patients in our study sample were HIV-positive (50.8%).

A study conducted by Gabriel, Barbosa and Vianna[10] with 1,837 HIV-positive patients who received outpatient care in the city of São Paulo verified a higher prevalence of male patients, with primary education, and working with general (37.1%), administrative (33.3%) or domestic services (17.8%). Up to the present, In Brazil, HIV-infected people are more likely to have lower levels of income and education[10].

We found 37.1% of our sample to present with opportunistic infections. In the study conducted by Gabriel, Barbosa and Vianna[10], the authors verified that 57.1% of patients had opportunistic infections, the most prevalent being pneumocystosis (11.7%), toxoplasmosis (11.6%), candidiasis (6.2%), cytomegalovirus (3.9%), herpes (3.5%), and cryptococcosis (3.2%).

Ravetti and Pedroso[11] conducted an epidemiological study with 99 HIV-positive patients admitted to emergency care and found that most patients were male (57.6%), were either discharged (66.7%) or died (12.8%), and that only 2.5% required MV. Although their discharge rate was similar to that verified in our study (69.1%), we found higher mortality (25.1%) and MV (35.4%) rates[11].

Ensrud et al.[12] found age and previous hospitalizations to be risk factors for in-hospital mobility impairment, thus corroborating our findings. Different from the profile of patients assembling our study, the authors evaluated the effects of hospitalization in the mobility and cognition of older women participating in the study of osteoporotic fractures. For that, they performed the short physical performance battery (SPPB), which tests balance, gait speed, and chair stand. Their results indicate a significant correlation between the battery values and mobility impairment, increasing age, lower cognition, history of recent hospitalization, and hospital length of stay. These findings differ from those found in our study in respect to the influence of length of stay on mobility impairment[12].

Jolley, Caldwell and Hough[13] conducted a study with multicenter data on adult trauma patients hospitalized in an intensive care unit (ICU) under MV and observed that patients mechanically ventilated for ≥14 days presented reduced mobility and range of motion due to immobility. The authors also emphasize that this prolonged bed rest led to a loss of muscle mass and overall strength, contributing for the physical function impairment reported by patients. This finding may justify the significant association between the use of MV and mobility impairment found in our study[13].

Jesus et al.[14] evaluated mobility decline in clinical and surgical ICU patients, especially those submitted to abdominal surgeries, and found no significant association between the use of MV, age, and the cause of hospitalization. Rather, their results indicate that mobility impairment is significantly correlated with ICU stay (>48 hours) and vasopressor use[14].

Richert et al.[15] evaluated changes in locomotor function and determinants of variations in lower-limb muscle function in HIV-infected patients based on three functional tests: five-times sit-to-stand (5TSTS), six-minute walk (6MWT), and 10-meter gait speed. Their results indicate that age, diabetes, HIV-related neurological complications, and injecting drug use may help deteriorate lower-limb muscle function. HIV-positive patients also presented a poorer performance at the 5TSTS and 6MWT tests when compared to healthy people of the same age range, deteriorating over time[15].

Christo[16] performed a review updating the epidemiological status, clinical characteristics, and diagnosis of HIV-related cognitive impairment. According to the author, neuroinfections and changes to the central nervous system (CNS) in patients with HIV/AIDS may lead to cognitive, emotional, motor, and behavioral impairment. Unstable gait, limb weakness, coordination disorders, slow movements,

and spastic tetraplegia are some of the motor signs and symptoms described in the work. Thus, these patients' mobility may decrease with the evolution of the disease and opportunistic infections affecting the CNS[16].

Studies addressing predictors of mobility impairment in hospitalized patients are still scarce in the literature, especially with those affected by infectious diseases. In that sense, studies on this theme may help health professionals, especially physical therapists, to understand the risk factors for this outcome and implement an early and more appropriate intervention to avoid the motor and functional impairment of patients during hospitalization.

This study has some limitations inherent to the data search in secondary sources, due to the presence of incomplete records and absence of important data. Another limitation is the heterogeneity in our sample, as patients affected by infectious and dermatological diseases, victims of animal accidents, and other causes were included in the study. We suggest that further investigations on this theme focus on specific disease groups found in hospitals with the same profile as that used in our study.

CONCLUSION

Our results indicate that age, number of previous hospitalizations, use of mechanical ventilation, HIV-positive patients, and the presence of opportunistic infections are predictors of mobility impairment in patients admitted to a hospital for tropical diseases. Physical therapists must devote particular attention for patients presenting with these risk factor to maintain and/or improve their motor and functional level.

Further research is required to identify the factors responsible for motor impairment in hospitalized patients, especially those at hospitals for infectious diseases, for improving the team approach to these patients.

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