






## ASSOCIATION OF THE SOCIODEMOGRAPHIC AND CLINICAL FACTORS WITH THE RISK OF HOSPITALIZATION AMONG ELDERLY INDIVIDUALS TREATED AT THE PRIMARY HEALTH CARE LEVEL

ASSOCIAÇÃO DOS FATORES SOCIODEMOGRÁFICOS E CLÍNICOS AO RISCO DE HOSPITALIZAÇÃO DE IDOSOS ATENDIDOS NA ATENÇÃO PRIMÁRIA DE SAÚDE

ASOCIACIÓN DE FACTORES SOCIODEMOGRÁFICOS Y CLÍNICOS AL RIESGO DE HOSPITALIZACIÓN DE PERSONAS MAYORES EN LA ATENCIÓN PRIMARIA DE SALUD

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### ABSTRACT

**Objective:** to analyze the association of the sociodemographic and clinical factors with the risk of hospitalization among the elderly treated at the primary health care level. **Method:** a quantitative cross-sectional study conducted with 368 elderly individuals enrolled in the Family Health Strategy (*Estratégia de Saúde da Família*-ESF). Data was analyzed using descriptive statistics, LOGISTIC REGRESSION model, the Mantel-Haenszel test, and correspondence analysis. **Results:** 75% of the respondents had low risk of repeated hospitalization; 19%, medium risk; 6.3%, medium-high risk; and 2.7%, high risk. The following variables were significantly associated with increased risk of hospitalization: depression, stroke, self-reported morbidities, marital status, and skin color. **Conclusion:** prospective population-based studies are suggested in order to investigate the causal relationship among other variables that were not addressed in the Probability of Repeated Admission questionnaire and the outcome hospitalization.

**Keywords:** Nursing; Risk; Hospitalization; Health of the Elderly; Primary Health Care.

### RESUMO

**Objetivo:** analisar a associação dos fatores sociodemográficos e clínicos ao risco de hospitalização de idosos atendidos na atenção primária de saúde. **Método:** estudo transversal, com abordagem quantitativa, realizado com 368 idosos cadastrados na Estratégia de Saúde da Família. Os dados foram analisados utilizando-se estatística descritiva, o modelo de REGRESSÃO LOGÍSTICA, o teste de Mantel-Haenszel e a Análise de Correspondência. **Resultados:** dos entrevistados, 75% evidenciaram risco baixo; 19% risco médio; 6,3% risco médio-alto e 2,7% risco alto. As variáveis estatisticamente significativas associadas ao aumento do risco para hospitalização foram: depressão, acidente vascular encefálico, morbididades autorreferidas, estado civil e cor da pele. **Conclusão:** sugere-se que sejam realizados estudos prospectivos, de base populacional, com o propósito de constatar uma relação causal entre outras variáveis e o desfecho hospitalização, que não são abordadas pelo Probability of Repeated Admission.

**Palavras-chave:** Enfermagem; Risco; Hospitalização; Saúde do Idoso; Atenção Primária à Saúde.

### RESUMEN

**Objetivo:** analizar la asociación de factores sociodemográficos y clínicos con el riesgo de hospitalización de ancianos en la atención primaria de salud. **Método:** estudio transversal con enfoque cuantitativo, realizado con 368 adultos mayores registrados en la Estrategia de Salud de la Familia. Los datos se analizaron mediante estadística descriptiva, el modelo de regresión logística, la prueba de Mantel-Haenszel y el análisis de correspondencia. **Resultados:** el 75% de los encuestados mostró bajo

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riesgo; 19% riesgo medio; 6,3% riesgo medio-alto y 2,7% riesgo alto. Las variables estadísticamente significativas asociadas con un mayor riesgo de hospitalización fueron depresión, accidente cerebrovascular, morbilidad autoinformada, estado civil y tez. **Conclusión:** se sugiere que se realicen estudios prospectivos basados en la población para establecer la relación causal entre otras variables y el resultado de la hospitalización, que no se enfocan en la escala de Probabilidad de Admisión Repetida (Probability of Repeated Admission).

**Palabras clave:** Enfermería; Riesgo; Hospitalización; Salud del Anciano; Atención Primaria de Salud.

## INTRODUCTION

Worldwide population aging results from several factors related to social, cultural, economic, and political changes in society. Before the 19<sup>th</sup> century, the worldwide demographic structure was mainly composed of young people, due to high birth and mortality rates. However, after the end of the 19<sup>th</sup> century, countries started to undergo a process called demographic transition. This process is a unique event characterized by decreased mortality rates, followed by decreased fecundity rates and consequent increased life expectancy.<sup>1</sup>

Occurring simultaneously with demographic transition, there is also epidemiological transition, which consists of changes in morbidity and mortality patterns over time. This transition involves three basic changes: communicable diseases were replaced by non-communicable diseases; morbidity and mortality burdens were transferred from the young to the elderly population; and the health situation shifted from the predominance of mortality to the predominance of morbidity, culminating in the emergence of chronic conditions.<sup>1</sup>

In this context, chronic conditions became the main causes of morbidity and mortality among the elderly. The high number of these conditions leads to major changes in the morbidity and mortality profile and in the demand for health care services, since older people are the most frequent users of these services, due to their greater organic weakness and high number of diseases, which results in increased health care costs for this portion of the population.<sup>1,2</sup> Additionally, hospitalization triggers a sequence of events among the elderly leading to increased weakness, decreased autonomy, decreased quality of life, and premature death. In this regard, an ecological study conducted in all Brazilian regions found high rates of hospitalization in the elderly population, especially in Southeastern and Northeastern Brazil.<sup>3</sup>

Therefore, it is increasingly necessary to develop health care actions focused on prevention, in order to reduce the number of diseases and hospitalizations. To this end, the Family Health Strategy (*Estratégia de Saúde da Família*- ESF) should aim at maintaining the elderly in their community,

through disease prevention, treatment and rehabilitation and through the active search of the risk factors that affect this population. Since the ESF is close to the daily life of the elderly, it favors the development of promotion and preventive actions aimed at reducing the increasing number of hospitalizations. Thus, hospitalization in advanced ages should only be considered when the resolving capacity at the primary care level becomes inefficient.

In view of this issue, a cohort study by Bolt *et al.*<sup>4</sup> developed an instrument to predict the risk of repeated hospital admission, the Probability of Repeated Admission (PRA) questionnaire, composed of eight risk factors for hospital admission in the elderly population, namely: male sex, age greater than 75 years old, availability of caregiver, poor health self-perception, cardiovascular disease, diabetes *mellitus*, hospitalization in the last 12 months, and six medical appointments in the last 12 months. In the Brazilian reality, studies confirmed the efficacy of the above instrument in the active search of elderly people at risk of repeated hospitalization.<sup>5-10</sup> In this context, the present study aimed to analyze the association of the sociodemographic and clinical factors with the risk of hospitalization among elderly people treated at the primary health care level.

## METHOD

This is a quantitative, descriptive, and cross-sectional study involving household visits to elderly individuals enrolled in the ESF in *João Pessoa*, state of *Paraíba*, Brazil. The study population comprised 66,802 elderly people enrolled in the ESF of the city of *João Pessoa* in 2014, according to the Primary Care Information System (*Sistema de Informação da Atenção Básica*-SIAB). The study participants were selected by probabilistic sampling. The sample size was estimated using the following formula:  $n = Z^2 PQ/d^2$ , where  $n$  = minimum sample size;  $Z$  = reduced variable;  $P$  = probability of finding the studied phenomenon;  $Q = 1-P$ ;  $d$  = desired accuracy. The  $p$ -value was set at 50% because this was a multidimensional evaluation, and the level of sampling error was set at 5%. Considering these parameters, the minimum number of elderly people to be investigated was 382.

To this end, the study included individuals older than 60 years of age of both genders registered in the ESF of *João Pessoa* who accepted to participate in the study. Conversely, the elderly individuals who were not enrolled in the above mentioned city were excluded from the study, as well as those with a cognitive deficit, measured using the Mini Mental State Examination (MMSE), hearing deficit, and speech problems that strongly impaired communication. In the end, the final sample consisted of 368 elderly individuals.

Considering that the sampling units of interest in the present study (individuals aged 60 years old or over) were allocated within Family Health Units (*Unidades de Saúde da Família-USFs*), which in turn are distributed within Health Sanitary Districts (*Distritos Sanitários de Saúde-DSS*), a three-stage sampling plan was designed. Therefore, the selection of participants involved the following stages:

- **Stage 1 (selection of the Health Sanitary Districts):** aiming to ensure the representativeness of the estimated sample, a stratified sampling plan was implemented so that all DSSs were represented in the sample and that the number of selected individuals within each district was proportional to the size of the district;
- **Stage 2 (selection of the Family Health Units):** after determining how many individuals would be investigated in each district, in the second stage 10% of the total number of USFs within each district were selected through simple random sampling, respecting the proportionality;
- **Stage 3 (selection of the sampling units):** once the USFs were selected within each district, a simple random sampling proportional to the size of these USFs was used to obtain the number of elderly individuals (sampling units) who would participate in the study, so that the number of selected individuals was equal to or higher than the estimated sample for each district and for each drawn USF.

Data collection took place from February to April 2014 through structured interviews conducted by undergraduate Nursing students of the *Universidade Federal da Paraíba*, with the assistance of community health agents. The interviewers were trained to achieve mastery in the use of the instrument and to standardize the interview technique. The instrument consisted of a structured form containing two parts, the first including sociodemographic and epidemiological variables and the MMSE and the second including the PRA. To operationalize the field research, the investigators drew a microarea and one of its streets. Subsequently, the households were randomly selected, so that, after the first household was drawn, the next third household in the sequence would be selected, and so forth.

In order to perform the analysis, data was first typed and organized into a computerized database, using the Statistical Package for Social Science (SPSS), version 20.0, in order to facilitate statistical treatment. Data processing included its codification, typing, and editing.

Data analysis was performed by the descriptive statistics of all variables, expressed as simple frequencies and means. Subsequently, a binary logistic regression model was used to evaluate the risks represented by the PRA factors. Goodness of fit for the logistic regression model was assessed using the Hosmer Lemeshow test, which showed that the data have good

fit to this model ( $p=0.106$ ). The Omnibus test (overall test) was used to investigate whether the model parameters are equal to zero, and yielded a  $p$ -value  $< 0.001$ , thus rejecting the null hypothesis and confirming the acceptability of the model. The logistic regression yielded a specificity of 98.3% and a sensitivity of 13.9%, which proved its reliability to predict the risk.

By means of a logistic regression model, the PRA generates a score from zero to one. The higher the score, the greater the risk of hospitalization. Cut-off points were suggested by studies conducted in Brazil, as shown in Table 1. The association between the risk of hospitalization and the other variables was assessed using the Chi-square test of associations, the Mantel-Haenszel test, and correspondence analysis, because these tests are appropriate to achieve the aim of the study and provide accurate and generalizable results.

Table 1 - Risk of repeated hospitalization and corresponding PRA score<sup>(5,8,9)</sup>

Risk classification	PRA score
Low risk	PRA $< 0.30$
Medium risk	PRA $0.30 - 0.39$
Medium-high risk	PRA $0.40 - 0.49$
High risk	PRA $\geq 0.50$

It is important to emphasize that, throughout the research process, the ethical aspects that rule research involving human beings were observed according to Resolution No. 466/2012 of CNS/MS/BRASIL.<sup>11</sup> The participants were asked to sign the Free and Informed Consent Form. Furthermore, the project was approved by Research Ethics Committee of the *Centro de Ciências da Saúde* under protocol No. 0575/13 and CAAE: 22372413.5.0000.5188.

## RESULTS

Of the 368 elderly individuals investigated in this study, most were female (68.5%), aged from 60 to 74 years old (68%), attended school for up to four years (36.1%), and had a monthly income of up to two minimum wages (88.3%). As for the risk of repeated hospitalization, 75% of the elderly had low risk; 19%, medium risk; 6.3%, medium-high risk; and 2.7%, high risk.

The Mantel-Haenszel test showed that the risk of repeated hospitalization exhibited an increasing linear association with depression and stroke ( $p=0.016$ ). The correspondence analysis revealed that married individuals were at low risk of hospitalization, whereas widowed individuals were at medium risk (Figure 1). It was also observed that the greater the number of self-reported morbidities by the elderly, the greater the risk of repeated hospitalization (Figure 2); and that white skin was

associated with low risk of repeated hospitalization, whereas black skin was associated with medium-high risk (Figure 3).

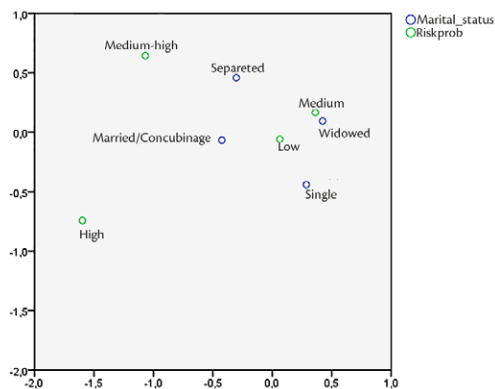


Figure 1 - Correspondence analysis for the crossing between risk of hospitalization and marital status. João Pessoa, Brazil, 2014.

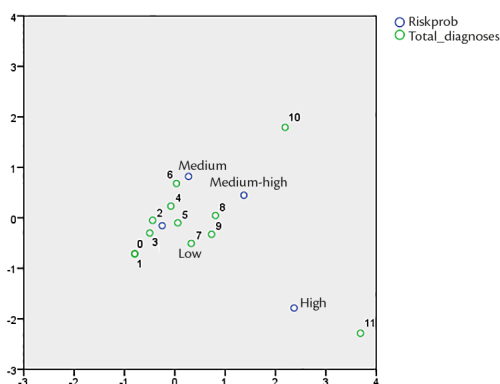


Figure 2 - Correspondence analysis for the crossing between the risk of hospitalization and the total of self-reported morbidities. João Pessoa, Brazil, 2014.

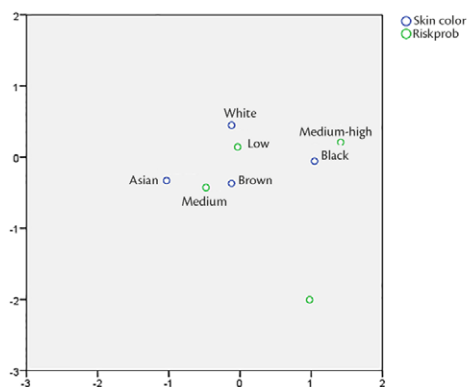


Figure 3 - Correspondence analysis for the crossing between the risk of hospitalization and skin color/race. João Pessoa, Brazil, 2014.

## DISCUSSION

With regard to the classification of the risk of hospitalization, the present study found similar results to those of national and

international studies that used the same instrument. At the international level, a research developed with American elderly individuals aged 70 years old or over showed that, in a sample of 5,876 individuals, 7.2% had high risk of hospitalization.<sup>4</sup> A study conducted in Germany, the United Kingdom, and Switzerland found that 7%, 4%, and 5% of the study population, respectively, had high risk of hospitalization.<sup>11</sup>

In Brazil, a study conducted in *Rio de Janeiro* involving 764 individuals older than 65 years of age revealed that 93.3% of the investigated population had low risk of hospitalization, and 6.7% had high risk.<sup>6</sup> Another research also conducted in *Rio de Janeiro* observed that, of the 1,423 respondents, 76.03% presented low risk of hospitalization; 13.4%, medium risk; 7.23%, medium-high risk; and 3.23%, high risk.<sup>9</sup> Moreover, a study with 360 elderly individuals treated at a public outpatient clinic revealed that 75.8% of the interviewed population were at low risk of hospitalization, and 11% were at medium to high risk.<sup>10</sup>

An investigation conducted in an academic health center in *Botucatu*, state of *São Paulo*, Brazil, involving 305 elderly individuals found that 56.4% of the interviewees had low probability of repeated hospitalization; 26.9%, low probability; 10.5%, medium-high probability; and, 6.2%, high probability.<sup>10</sup> Additionally, in *Progresso*, state of *Rio Grande do Sul*, Brazil, an investigation conducted with 515 individuals aged 60 years old or over revealed that 64.4% of the interviewed population were at low risk of repeated hospitalization; 17.7%, at medium risk; 11.1%, at medium-high risk; and 7%, at high risk.<sup>7</sup>

The relevance of the PRA questionnaire is evidenced by prospective cohort studies which observed that individuals classified with high risk of hospitalization had a higher number of hospitalizations compared to low-risk individuals. In the international reality, the odds ratio for hospitalization was found to be 2.3 times among high-risk individuals, and, in the Brazilian context, the frequency of hospitalization was found to be 6.5 times higher among these individuals when compared to the elderly individuals, who presented low risk of hospitalization.<sup>7,10,11</sup>

Stratifying the risk of repeated hospitalization in the elderly enables to prioritize the health care demand, which ensures that decision-making on priorities is grounded on the principle of equity, making it possible to guide the elderly population to appropriate and resolving health actions according to the involved risk. As for individuals at medium, medium-high, and high risk, it is necessary to strengthen the planning of assistance and preventive measures, respecting the priorities across the risk strata. Conversely, health promotion actions directed to low-risk elderly individuals should focus on engaging them in interaction groups, thus allowing for the exchange of knowledge and encouragement of self-care.<sup>8</sup>

Ordinance N° 2,528, dated October 19<sup>th</sup>, 2006, which approved the National Policy of Elderly Health (*Política Nacional de Saúde da Pessoa Idosa*),<sup>12</sup> states that the managers of the Unified

Health System (*Sistema Único de Saúde, SUS*) at the municipal and state levels need to implement management instruments based on data surveys of the sociodemographic and clinical characteristics of the elderly population, with the engagement of several players involved in the planning of health actions directed to this population. Furthermore, health care planning for the elderly should be based on lines of care and consider their rights, choices, and needs, thus ensuring the functioning of bi-directional flows (reference and counter-reference) and the full access to health care levels, which should be optimally structured, with appropriate physical infrastructure, supplies, and human resources skilled in health care for the elderly.

The results of the present study also reveal statistically significant associations between high risk of hospitalization and the following variables: depression, stroke, number of self-reported morbidities, marital status, and skin color. Depression is the most common psychiatric syndrome among the elderly population, due to the influence of some biopsychosocial aspects and genetic factors that often accompany the complex process of aging.<sup>13</sup> It is characterized by depressed mood, absence of enthusiasm or pleasure, and biological changes, being one of the most severe diseases in advanced age.

In 2012, 350 million people suffered from depression worldwide, and it was considered the leading cause of disability. In Brazil, 4.7 to 36.8% of the elderly population has depression, accounting for 9.2% of all chronic diseases. Its signs and symptoms are present in 8 to 16% of the elderly, and it represents one of the three leading causes of disability in this population. With regard to depression in the elderly, it should also be considered that the manifestation of the symptoms peculiar to this disease are often confused with normal characteristics of aging, which hampers diagnosis and early treatment.<sup>13</sup> It is worth emphasizing that depression is a disease and thus it is not intrinsic to old age; hence, health professionals have to be more attentive to the signs and symptoms of depression so that the patient can be referred to an appropriate treatment.

Stroke is the most frequent ischemic event in the elderly population, resulting in the interruption of blood flow to the brain and causing damage to the brain tissue.<sup>14</sup> The occurrence of this damage increases considerably after 60 years of age and, when associated with clinical and neurological complications, leads to disabilities and sequelae that may be irreversible. These disabilities result in decreased functional competence, inactivity, increased risk of falls, and consequent hospitalization.

Although stroke may occur at any age, advance age is a well-known risk factor for this event and one of the main determinants for its occurrence. Thus, its impact on public health is a major reason for concern, due to pronounced population aging.<sup>14</sup> Therefore, it is crucial that the health services implement preventive measures and management of

the risk factors for cerebrovascular diseases, which should be undertaken by the health professionals, especially at the primary health care level, in order to foster aging and maintenance of the functional capacity in the aging population, as suggested by the National Policy of Elderly Health.<sup>12</sup>

As for the number of self-reported morbidities, the present study found that the greater the number of morbidities, the greater the risk of repeated hospitalization in the investigated population. A scientific study on quality of life and on the associated morbidities among elderly individuals enrolled in the ESF found that most of the respondents reported to have at least one of the 12 health problems investigated by the National Household Sampling Survey and that these chronic health conditions are associated with poorer quality of life and increased morbidity and mortality predictors among the elderly.<sup>15</sup>

According to the National Health Survey conducted in 2013, chronic conditions were present in 45% of Brazilians. Some of the chronic conditions with great potential for severity and mortality in Brazil are cardiovascular and respiratory diseases, diabetes, and neoplasms, which caused 80.7% of the deaths from chronic diseases. The physiological changes intrinsic to aging, when associated with poor lifestyle, make individuals more prone to the occurrence of morbidities. Therefore, the simultaneous occurrence of several chronic diseases leads to increased disabilities, increased dependence, decreased autonomy, and decreased quality of life in the elderly population, in addition to significantly increasing health services use and health care costs.<sup>16</sup>

With regard to marital status, the present investigation found an association between widowhood and medium risk of hospitalization, whereas being married was associated with low risk. The literature shows that widowhood is one of the most predominant marital statuses in older age, especially among women. Moreover, widowhood causes a major impact on the elderly's life, mainly on women, not only because of the grief resulting from the absence of the spouse's but also because of the difficulty in adapting to the new social status, to economic changes, and to material loss. Widowed elderly individuals may develop emotional, psychological, and physical problems, such as emotional disorganization, mood and sleep changes, depression and anxiety symptoms, negative health self-perception, and impaired self-preservation capacity.<sup>17</sup>

An investigation that addressed the sociodemographic differentials of mortality in younger-old and older-old individuals found that, among the investigated population, the highest rate of death (38.4%) was observed in widowed and older (80 years old or over) individuals. Being married was associated with a low risk of hospitalization, thus playing a protective effect, since it reduces socioeconomic vulnerability and improves life and health habits, especially among the elderly. Several



environmental, economic, social, and psychological factors are associated with and lead to increase chances of survival in married elderly individuals. Additionally, marriage is selective, since it chooses healthier people both physically and mentally.<sup>18</sup>

The present research also observed that black skin was associated with medium-high risk, whereas white skin was associated with low risk of hospitalization among the respondents, which is in line with an American study that also found an association between black skin and an increased risk of hospitalization.<sup>11</sup> The relevant literature suggests that the association of poorer health with black skin is related not only to skin color, but also to other socioeconomic variables. A study that analyzed the relationship between skin color/race with health indicators in Brazilian elderly individuals included in the database of the National Household Sampling Survey revealed that 50.1% of the uneducated elderly were black; only 7.2% of the elderly individuals of this ethnicity had more than nine years of schooling; only 8.8% belonged to the highest income quintile; and 88% of the black elderly relied exclusively on the SUS.<sup>19</sup>

Furthermore, the same study observed that the prevalence of poor and very poor health self-assessment was higher among brown and black people, with the chance of reporting poor health status being 39% higher among the black compared to the white. Similarly, the prevalence of chronic conditions is 78.6% among the black elderly. There are race discrepancies regarding the social rights denied to the black throughout their lives, which results in a decreased quality of life when they reach old age. Notable among these are health-related discrepancies, leading black and poor individuals to be exposed to more risk factors and thus to present more health conditions compared to white individuals.<sup>19</sup>

It is worth emphasizing that social inequalities are a consequence of social, political, economic, demographic, and cultural processes arising from different social and historical contexts. These inequalities lead to difficulties in accessing the income and the rights established as basic, such as education, health, social security, housing, and cultural good for historically excluded groups. In this scenario, the race inequalities found in Brazil, rooted in racism, hamper the access to goods and services and undermine the health of black individuals.

Studies that used the PRA questionnaire in the Brazilian reality confirmed its usefulness to detect the risk of hospitalization in the elderly; however, it should be considered that the instrument was developed more than 10 years ago and that it was initially administered in a different socioeconomic reality. Data from the present study shows that other clinical and sociodemographic variables not addressed in the PRA questionnaire are also associated with an increased risk of hospitalization, such as depression, stroke, marital status, number of self-reported morbidities, and skin color.

Another finding worth noting is the number of self-reported morbidities, which is greatly relevant in view of the increasing number of chronic conditions in the elderly population. In this context, it is suggested to replace the “diabetes” and “hypertension” variables with one that measures the total number of self-reported morbidities, since other diseases, e.g., depression and neoplasms, are also major causes of hospitalizations, especially when occurring simultaneously.

## CONCLUSION

In view of the foregoing, it was concluded that the empiric data obtained in this research provides important grounds for planning and implementing interventions to improve health care equity, life conditions, and well-being in the studied population. Additionally, prospective population-based studies are suggested in order to investigate the causal relationship between the factors presented and the outcome of hospitalization.

It is worth reassuring the importance of risk stratification using instruments specific for the elderly, such as the PRA questionnaire, in order to improve knowledge on the health status of the assisted population, because it will enable the understanding of priorities and of the paths to be followed throughout the health care network seeking for more efficient care and for the strengthening of health promotion actions, especially those directed to individuals at low risk for repeated hospitalization.

To that end, it is crucial to increase the commitment of the health managers to the implementation of protocols that guide entry points to health care with particular programs, in order to improve the use of the services by structuring access and consequently improving the health of the users. The multidisciplinary team, especially the nurse, should be attentive to correctly guiding elderly individuals according to their risk, because this team plays a prominent role in recognizing the predisposing factors that support or increase the risk of repeated hospitalization, with the purpose of stabilizing such factors and reducing this risk in the above mentioned population.

The limitation of this study was the fact that the instrument used was not validated in the Brazilian reality. Moreover, due to its cross-sectional design, it was not possible to establish cause-effect relationships. Conversely, despite worldwide social and political differences, the variables included in the PRA questionnaire were found to be related to repeated hospitalization in elderly individuals of different socioeconomic realities. Furthermore, this instrument contains simple and objective questions, thus being easy and quick to administer, and may be administered by any previously trained member of the multiprofessional health team.

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