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Prevalence of pressure ulcers in hospitals in Brazil and association with nutritional status—A multicenter, cross-sectional study

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ABSTRACT

Background: Pressure ulcers (PU) represent a widespread, painful, and expensive health care problem directly associated with increased morbidity, mortality, and length of hospital stay. The aim of this study was to determine the prevalence of PU in hospitalised patients in public and private Brazilian institutions and the ulcers' associations with nutritional status and other risk factors.

Methods: A multicenter, cross-sectional, quantitative and qualitative study was carried out in hospitals in different geographic regions of Brazil from March 2009 to February 2011. The prevalence and characteristics of PU, the nutritional status and the association between the presence of PU, and the nutritional status and other study variables were evaluated. The association of the presence of PU with the study variables was performed by univariate analyses and multivariate logistic regression models. The final multivariate model was one in which all variables were significant at the 0.05 level.

Results: According to the subjective global assessment (SGA), the prevalence of PU was 16.9%, and 52.4% of patients were malnourished. PU and their severity were directly associated with malnutrition ($P < 0.05$). Patients who are bedridden, who are elderly, who have neurological disorders or cancer, who are staying at a public or private institution, and who are staying at the hospital between 8 d and 15 d had an increased risk of PU ($P < 0.05$).

Conclusion: The prevalence of PU in Brazilian general hospitals is high, and the prevalence of malnutrition is extremely high. Malnourishment is one of the most important risk factors associated with the development and severity of PU in hospitals. Patients who are malnourished are more prone to developing PU.

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Background

Pressure ulcers (PU) represent a widespread, painful, and expensive health care problem [1–3] directly associated with increased morbidity, mortality, and length of hospital stay [4–7].

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Patrícia Brito developed the study design, collected the data and drafted the manuscript.

Simone de Vasconcelos Generoso analysed data and drafted the manuscript.

Maria Isabel Toulson Davisson Correia developed the study design, supervised the study and finalised the manuscript.

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Several risk factors, including malnutrition, are associated with the development of PU [8]. Malnutrition has been shown to be strongly related to the risk of developing these lesions because of its negative impact on wound healing [9,10].

PU and malnutrition are an extremely inconvenient combination for patients and the health care system [11,12]. The relationship between PU and malnutrition deserves further assessment, as the latter is highly prevalent worldwide [13]. In the literature, there have been several studies assessing the prevalence of pressure ulcers, but most are restricted to specific regions and cities, and some hospital clinics and specific patient groups [14–20].

The aim of this study was to determine the prevalence of PU in hospitalised patients in public and private Brazilian institutions and its association with nutritional status and other risk factors.

Methods

Study population

This study was a multicenter, cross-sectional, quantitative and qualitative study carried out in hospitals in different geographic regions of Brazil from March 2009 to February 2011.

Hospitals were enrolled if they were classified as general institutions; had more than 100 beds; agreed to participate based on a previous invitation sent to one of the nutritional team members; and were approved by the ethical committee. In each hospital, patient selection was performed by a random drawing based on a map of the bed distribution. If the chosen bed was empty or if the patient did not fulfil the inclusion criteria, the next bed was chosen in ascending order. Patients who were younger than 18 yr, had psychiatric disorders, could not communicate or had no guardian to do so, or were in contact isolation were excluded from the study. The numbers of patients included in each city as well as the number of that city's inhabitants are depicted in Table 1. All patients or their guardians provided written consent prior to their enrollment.

Seventy-four percent of the evaluations were carried out by the principal investigator.

Assessment of pressure ulcers and clinical characteristics

Patients underwent a physical examination to evaluate skin integrity to detect the presence of PU. If PU was detected, the location and classification of the stage were recorded. If more than three PU were detected, this information was recorded in the protocol as an independent variable. The severity of PU was based on international classification guidelines proposed by the guide of prevention and treatment of the European Pressure Ulcer Advisory Panel and the American National Pressure Ulcer Advisory Panel (EPUAP/NPUAP) [21]. This system classifies ulcers from stage I to stage IV. In addition, medical records were reviewed to determine risk factors. Age, sex, primary diagnosis, presence of infection, and length of hospital stay from the d of admission until the d of the current assessment were collected.

Assessment of nutritional status

The nutritional status of the patients was determined by subjective global assessment (SGA). The SGA was carried out as proposed by Detsky et al. [22] and it comprises an evaluation of current weight, weight before illness, and weight change in the previous 6 mo and in the last 15 d; nutritional history (appetite, dietary intake, gastrointestinal symptoms); gastrointestinal derangements (diarrhea, vomiting, nausea); functional physical capacity; and physical assessment (fat loss, muscle wasting, and presence of leg and sacral edema and ascites). The information necessary to complete the SGA was collected from either the patients or their accompanying family members. Patients were classified as well-nourished, suspected or moderately malnourished, or severely malnourished.

Statistical analysis

The data were processed using Excel software and the statistical analysis was performed with SPSS 13.0 (SPSS Inc., Chicago, USA). Continuous variables were expressed as the mean \pm standard deviation when normally distributed and as the median \pm interquartile range for non-normal variables. Normality was assessed by the Shapiro Wilks test. The association of the presence of PU with the study variables was performed by univariate analysis and a multivariate logistic regression model. The final multivariate model was one in which all variables were significant at the 0.05 level. The fit of the multivariate model was assessed by the Hosmer-Lemeshow goodness-of-fit test.

Table 1

Estimated and actual number of primary assessments achieved in each city in Brazil included in the study, 2011

Cities	N inhabitants*	N assessments (%)
Belo Horizonte—MG	2,412,937	86 (18.2)
Manaus—AM	1,646,602	49 (10.4)
Rio de Janeiro—RJ	6,093,472	127 (26.8)
São Paulo—SP	10,886,518	86 (18.2)
Cuiabá—MT	526,830	33 (7.0)
Natal—RN	774,230	32 (6.8)
Curitiba—PR	1,797,408	60 (12.7)
TOTAL	32,440,772	473 (100)

* Data based on Instituto Brasileiro de Geociências, 2009.

Results

General characteristics and nutritional status

A total of 473 patients, 251 men and 222 women, with a mean age of 58.4 (18–103) years were enrolled in the study. There were 184 (38.9%) patients classified as elderly. The majority of patients were admitted to public hospitals (157; 33.2%), with 75 (15.9%), 196 (41.4%) and 45 (9.5%) in university, private, and public institutions, respectively. The most prevalent diagnoses were cancer (23.5%), followed by diabetes (16.3%) and infections (14.8%). One hundred forty-three patients (30.4%) were bedridden, and the median length of hospital stay was 8 d, with an interquartile range of 18 d (Table 2).

Prevalence and characteristics of PU

Eighty patients had PU, giving a prevalence of 16.9%. Thirteen (16.3%) had more than three PU. Sacral, trochanteric, calcaneal, and back and elbow regions were the most affected. Other locations, such as the occipital region, neck, ankle, ear, and sides of the knee were also observed. Most patients presented with stage I and II ulcers (Table 3). There was no significant difference in PU prevalence among geographic regions.

Nutritional status

According to the SGA, 47.4% patients were classified as well nourished, 30.2% were classified as suspected or moderately malnourished, and 22.4% were classified as severely malnourished.

Association between presence of PU, nutritional status, and other study variables

PU and their severity were directly associated with malnutrition, as shown in Table 4. Elderly patients, patients with clinical diagnoses, neurology and cancer patients, bedridden patients, infected patients, and patients in use of nutritional therapy also presented with increased risk of PU when assessed by univariate analysis. There was a significant association between the presence

Table 2

Clinical data of 473 hospitalized patients in Brazil, 2011

Patient characteristics	N	%
Diagnosis		
Infections	70	14.8
Diabetes	77	16.3
Cancer	111	23.5
Miscellaneous	258	46.4
Specialties		
Neurology	80	17.0
Oncology	106	22.6
Orthopedics	37	7.9
Others	250	52.5
Type of treatment		
Surgical	236	49.6
Clinical	239	50.4
Terminally ill		
No	334	70.6
Yes	54	11.4
No information	85	17.9
Bedridden	143	30.2
Length of stay		
Up to 7 d	233	49.2
From 8 d to 15 d	84	17.8
Greater than 16 d	156	33.0

Table 3
Characteristics of PU in hospitalized patients in Brazil, 2011

Variable	N	%
Number of PU/patient		
1	42	52.5
2	17	21.3
3	8	10.0
≥4	13	16.3
Location of pressure ulcers		
Sacral	66	82.5
Trochanteric	30	37.5
Calcaneus	22	27.5
Lumbar	5	6.3
Elbow	3	3.7
Others	13	16.2
Severity of the main PU		
I	24	30.3
II	26	32.9
III	18	22.8
IV	12	13.9

of PU and a length of stay of more than 8 d. However, in the adjusted multivariate model (Table 5), the variables associated with the risk of PU were being bedridden, older, having neurological disorders and cancer, being malnourished, being in a public and private institution, and staying in the hospital between 8 d and 15 d. According to the Hosmer-Lemeshow test, the data fit the model perfectly ($P = 0.999$; Table 5).

Discussion

In Brazil, as in other countries throughout the world, studies of PU have shown their prevalence in specific patient groups, such as the elderly or the chronic terminally ill. A few hospital departments, such as neurology, as well as long-stay institutions have been associated with PU prevalence [13–19]. However, few studies have assessed the overall inpatient population in general hospitals with the goal of assessing the rate of PU and the associated risk factors, as this study has done. The prevalence of PU was 16.9%, similar to data from two other international studies in hospitals with similar inclusion criteria [19,23]. There was no significant difference between the prevalence of PU in the seven Brazilian states studied, indicating that this is a national health problem.

In agreement with the findings of various studies [14,24–26], the most frequent location of PU was the sacral region (82.5%), followed by the trochanteric (37.5%), and then the calcaneus (27.5%). This finding is certainly due to the common dorsal position patients assume in bed [14–16,20,27,28]. Furthermore, well known patient risk factors such as immobility, age, and nutritional status increased the probability of presenting with PU [4,19,20,27,29,30].

Our data showed that 30.4% of the patients were bedridden, and the probability of having pressure ulcers was 75 times higher than that of nonbedridden individuals. Immobile patients are totally dependent on caregivers for both bed repositioning

Table 4
Univariate model for the severity of PU and the nutritional status of hospitalized patients in Brazil, 2011

Variables	Malnourished	
	Yes	No
Severity of PU		
I	20 (83,3)	04 (16,7)
≥II	55 (98,2)*	01 (1,8)

* P value by chi-squared test (significance <0.05).

Table 5
Multivariate model for the presence of PU considering demographic and clinical characteristics of 473 hospitalized patients in Brazil, 2011

Variables	OR—(95% CI)
Malnutrition	10.46 (3.25;33.69)*
Bedridden	74.96 (24.18;232.36)*
Age ≥65 yr old	2.34 (1.03;5.29)*
Admission clinic	
Other	1.0
Neurology/oncology	6.57 (2.90;14.86)*
Length of stay	
Up to 7 d	1.0
From 8 d to 15 d	3.85 (1.53;9.73)*
Greater than 16 d	2.46 (0.90;6.68)
Type of institution	
University/public	1.0
Philanthropic/private	2.93 (1.21;7.07)*

Hosmer-Lemeshow test P -value = 0.999.

* $P < 0.05$.

and mobilization, increasing the risk of exposure to friction/shear forces and the subsequent development of pressure ulcers [31,32]. Therefore, it is important to optimize skin care among these patients to prevent pressure ulcer development [32].

We also observed that elderly patients presented with an OR of 2.34, showing an increased risk for PU development when compared with younger patients. These findings are consistent with those in the literature that show a higher incidence of pressure ulcers in patients aged more than 60 yr due to decreased skin vascularisation and pain perception and increased inflammatory response associated with senescence [15,18,33]. Furthermore, patients admitted to neurological and oncological clinics also presented with an increased risk similar to that reported by Blanes et al. [15] In a more recent work that included 672 patients in 3 Irish hospitals, the authors found reduced mobility (OR 8.84, 95% CI 5.04–15.48, $P < 0.01$) and length of hospitalization (OR 1.02, 95% CI 1.–1.02, $P < 0.01$) as factors significantly associated with PU [18].

Impaired nutritional status is considered an important risk factor in the outcome of hospitalized patients. Thus, it is noteworthy that in the current study, 98% of those who showed severity of PU greater than or equal to stage II were malnourished, and 16.3% of the high-severity patients had more than three PU. Ten years after the Brazilian Survey on Hospital Nutrition Status (IBRANUTRI), malnutrition remains a problem with even higher rates (52.6% versus 48.1%). Severe malnutrition was also increased in the current study (22.4% versus 12.6%) [3,34]. The relationship between malnutrition and PU has often been described [30,35–38]. However, in our study, the association between malnutrition and PU was 10.5; this OR is much higher than in other studies, which reported ORs between 1.9 and 2.6 [3,11]. These data confirm that although hospital malnutrition has been widely demonstrated and discussed, adequate intervention remains a problem.

The type of institution in which the patients were hospitalized and the length of stay were two extrinsic variables impacting PU risk. The first week of a patient's hospital stay should be a period of hypervigilance to assess the risk for pressure ulcers, and strategies to prevent such ulcers should be aggressively implemented, especially if the patient is already malnourished³². Therefore, nutritional assessment should be part of hospital routine admission. Nutritional assessment should be focused on the groups of patients mentioned previously and should be a mandatory part of protocols. The latter should aim for the prevention of factors that increase PU risk [38–41]. Therefore, the prevention of PU should be more important than the treatment because the cost of prevention is lower and the length of the

hospital stay can be shortened without risk to the patient. Appropriate actions and a correct interdisciplinary approach will enable better outcomes and cost rationalization and will improve the quality of life for patients and their caregivers.

Conclusions

The prevalence of PU in Brazilian general hospitals is high, and there is an alarming rate of malnutrition. The latter is one of the most important risk factors associated with the development and severity of PU in hospitalized patients. Malnourished patients are prone to the development of PU. Similarly, other risk characteristics, such as age and immobility, require special attention because they are related to higher PU prevalence rates.

Competing interests

No competing interests.

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