

RISK FACTORS FOR PRESSURE ULCER DEVELOPMENT IN INSTITUTIONALIZED ELDERLY

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This study aimed to analyze the risk factors for the development of Pressure Ulcers (PU) in old people living in Long Staying Institutions. It is a prospective and cohort study carried out in four Institutions. A total of 94 old people composed the sample and were assessed during three consecutive months. The total scores of the Braden Scale were different between the groups with and without PU, at the first ($p=0.030$) and last assessments ($p=0.001$); humidity, nutrition and friction/shearing were significantly different between those with and without PU, and were always worst among the first. Female gender and previous PU were confirmed as predictive for the development of PU ($r^2=0.311$).

DESCRIPTORS: risk factors; pressure ulcer; aged; homes for the aged

FACTORES DE RIESGO PARA EL DESARROLLO DE ÚLCERAS POR PRESIÓN EN ANCIANOS ATENDIDOS EN ASILO

La finalidad del estudio fue analizar los factores de riesgo para el desarrollo de Úlceras por Presión (UP) en ancianos que viven en asilos. Es un estudio de cohorte prospectivo y fue desarrollado en cuatro instituciones. Noventa y cuatro ancianos compusieron la muestra y fueron evaluados consecutivamente hasta tres meses. Las puntuaciones totales de la Escala de Braden fueron diferentes entre los grupos con y sin UP, en la primera ($p=0.030$) y la última evaluación ($P=0.001$); humedad, nutrición y fricción fueron estadísticamente diferente entre los ancianos con y sin UP, peor entre aquellos con UP. El sexo femenino y UP previo fueron confirmados como predictivos para el desarrollo de PU ($r^2=0.311$).

DESCRIPTORES: factores de riesgo; úlcera por presión; anciano; hogares para ancianos

FATORES DE RISCO PARA O DESENVOLVIMENTO DE ÚLCERAS POR PRESSÃO EM IDOSOS INSTITUCIONALIZADOS

Este estudo objetivou analisar os fatores de risco para o desenvolvimento de úlceras por pressão (UP) em idosos institucionalizados. Estudo de coorte prospectivo foi realizado em quatro instituições de longa permanência para idosos. Noventa e quatro idosos foram avaliados durante até 3 meses consecutivos. Os escores totais da Escala de Braden diferiram entre os grupos com e sem UP, na primeira ($p=0,030$) e última avaliações ($p=0,001$), umidade, nutrição e fricção e cisalhamento foram significativamente diferentes entre os idosos com e sem UP, sempre piores entre os primeiros. Sexo feminino e úlcera prévia foram preditivos para a formação das UP ($r^2=0,311$).

DESCRIPTORES: fatores de risco; úlcera de pressão; idoso; instituição de longa permanência para idosos

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INTRODUCTION

Certain risk factors have been confirmed as predictive for pressure ulcer (PU) development, which implies physical, emotional, and social overloads for patients and their families. This consequently reduces the quality of life and increases health service costs, due to longer hospitalization periods and higher morbidity and mortality rates.

In relation to the PU concept, two definitions have been adopted: the National Pressure Ulcer Advisory Panel (NPUAP)⁽¹⁾ stated that "PU are caused by prolonged pressure and typically occur on bony prominences in individuals restrained to a bed or wheelchair"; and the European Pressure Ulcer Advisory Panel (EPUAP)⁽²⁾ says that "PU is an area of cellular death on the skin and underlying tissues caused by pressure, shearing, friction and or a combination of these factors". These concepts establish not only the nomenclature currently employed for this type of lesion, but also its main etiology.

In 1987, North American authors⁽³⁾ developed a conceptual chart about etiopathogeny for PU development, from two critical etiological determinants: pressure intensity and duration; and tissue tolerance to support that pressure. In addition, other extrinsic and intrinsic factors contribute to PU development. While extrinsic factors include friction and shearing associated with moisture, intrinsic factors consist of loss of sensitivity and reduction in muscular strength or mobility, incontinence, hyperthermia, anemia, protein malnourishment, smoking and old age.

Older people's skin goes through various changes due to the intrinsic aging process and environmental factors, especially ultraviolet radiation (actinosenescence). Aged skin takes part in regressive changes in various organic sectors, and is classified in two types: intrinsic - chronological (genetic) or pathological (genetic or not) - and extrinsic. Therefore, senescence is a biological consequence of lifetime. Pseudo-senescence, on the other hand, results from the aggression of environmental factors on the human skin throughout one's existence⁽⁴⁾.

Elderly skin assessment is based on physiological criteria like hydration, changes in sebaceous secretion and sweat glands and permeability; and biological criteria, based on changes to the connective tissue and the four intercellular

matrix molecules: collagen, elastin, proteoglycans and glycoprotein, as well as the fibroblasts that synthesize them⁽⁴⁾.

Aging fragileness associated with morbid conditions, such as changes to neurological and mental states, nutritional conditions, mobility, anal and urinary activity and continence, characterizes a population predisposed to PU development, reoccurrence and complications. This is an overall view that has led to the growing need for their institutionalization⁽⁵⁾.

Long-Stay Institutions for the Elderly (LSIE) are facilities designed for integral institutional care. The target population includes people older than 60, dependent or not, who are not able to stay with their family or at home. These institutions receive various names, including: shelter, home, nursing home and geriatric clinic. To meet this age group's needs, these facilities provide, for instance, social, medical, psychological, nursing, physical therapy, occupational therapy and dental services⁽⁶⁾.

These locations should provide a residential environment, keeping the characteristics of a home. They should not be marked by isolation, away from urban life, or be a space that simplifies its users' lives⁽⁶⁾.

The motivation to develop this study was based on recognizing age as a fundamental aspect of PU etiopathogeny and the lack of Brazilian studies about PU risk factors in institutionalized elderly. Hence, the study objectives were: to analyze PU risk factors and verify the statistical associations between risk factors and PU occurrences in elderly people living in LSIE.

CASUISTIC AND METHOD

This quantitative prospective cohort study was carried out at four LSIE in three cities in Southern Minas Gerais State, selected by their characteristics: philanthropic, non-profit organizations (recognized as of Federal Public Utility and registered under the National Social Service Council), with similar human and physical resources.

The project was first approved by the Institutions' Administrative Councils, and next by the Institutional Review Board at the University Vale do Sapucaí (UNIVAS), under protocol number 244/04, and according to resolution 196/96 by the National Health Council regarding research involving human beings.

In this study, the LSIE are identified by letters - A, B, C, and D - so as to preserve ethic secrecy regarding their real names. At these institutions, health care is not systemized and there are no PU prevention protocols, including specific risk assessment for development or treatment. In fact, treatment is initiated when PU are detected, usually from stage II onwards.

The study population consisted of 275 elderly, residents in LSIE during the data collection period; distributed as follows: A= 56; B= 71; C= 46; and D= 102 elderly.

Ninety-four elderly comprised the study sample, and met the following criteria: aged 60 years or older; Braden Scale score indicating PU development risk; and agreement to participate in the study. The exclusion of 181 elderly from several institutions occurred due to: age under 60 years (36), total Braden score ≥ 19 (139), refusal to take part in the study (6). Moreover, three deaths occurred among the elderly in the final sample.

The lead researcher and nine collaborators collected the data. Collaborators participated in a six-stage training program, consisting of theoretical and practical classes, in addition to group and individual assessments. They were considered apt for data collection when a 100% agreement was obtained among the simultaneous observations made by collaborators and the researcher. Folders with data collection instruments, lists with the resident elderly people's names and the program for visiting days were appropriately organized for each LSIE.

After receiving agreement, written consent was requested. In case the participant was not physically or mentally capable of providing written consent, requests were made to those responsible at the institution.

After obtaining consent from the elderly or the person responsible and after checking their ages, the next step was to assess UP development risk, using the Braden Scale and physical examination, aiming to detect previous PU. Elderly with risk scores ≤ 18 ⁽⁸⁾ were included in the study sample until PU development, death, transfer, "discharge" or follow-up completion (90 days). Data collection took place in 2004, and was performed three times a week (Mondays, Wednesdays and Fridays); from June to September at institutions A and B, from August to November at institution C and from October to December at institution D. Elderly with previous PU

who still had a risk score were kept in the study to evaluate the occurrence of new lesions.

Elderly admitted to the LSIE before the 80th data collection day, who met the inclusion criteria, were evaluated until completing at least 20 evaluation days. When participants were transferred from the LSIE to hospital or their home, they were considered new cases only if their return to LSIE occurred 3 days after they had left the institution.

During follow-up, when PU was detected, a careful local exam was performed, evaluating stage, measurement and location. From this moment onwards, elderly were excluded from the study and lesion treatment was initiated, in accordance with the institution's practice.

Sociodemographic and clinical data (diseases and drugs used) were collected from the institution's patient form and completed at their side, during the physical examination. Other data, like weight and height, were collected through individual evaluations, using standardized techniques and equipment in every LSIE. Techniques were adjusted to participants who were restricted to their beds.

Some clinical variables, such as Body Mass Index (BMI) and PU stages, were evaluated according to international standards⁽¹⁾. PU measurement was done with a millimeter ruler: the length was measured in the cephalic-caudal direction, and width in the latero-lateral direction. For ulcers in stages II and IV, depths were evaluated using sterilized cotton swabs, which were later measured with the standardized millimeter rule. Irregular wounds were measured by the largest dimensions, as per international recommendations⁽⁹⁾.

Results were subjected to the following tests: Pearson's chi-square, Fischer's exact, Kolmogorov-Smirnov, Student's t; Mann-Whitney and *Stepwise Forward*. Variable associations below .05 were considered statistically significant.

RESULTS

Study results show that most participants were women (62.8%), white (68.1%), between 60 and 103 years old, with an average age of 79.1 ± 9.59 and median of 80.5 years. The institutionalization period ranged from 1 day to 23,360 days.

Clinically, a normal BMI was observed, with an average of 20.9 ± 4.9 and median of 20.3. Most

elderly had urinary system diseases (58.4%), and cardiovascular and respiratory conditions (57.4%). Neurological (47.9%) and dermatological (40.4%) diseases also stood out. There was frequent use of neuroleptic and psychotropic drugs (52.1%), as well

as antihypertensives (38.3%), with a median of two medications per person, with up to six drugs per person. As to smoking, it was observed that most elderly (80.1%) were non-smokers. Twenty-seven elderly (28.7%) had previous PU cases.

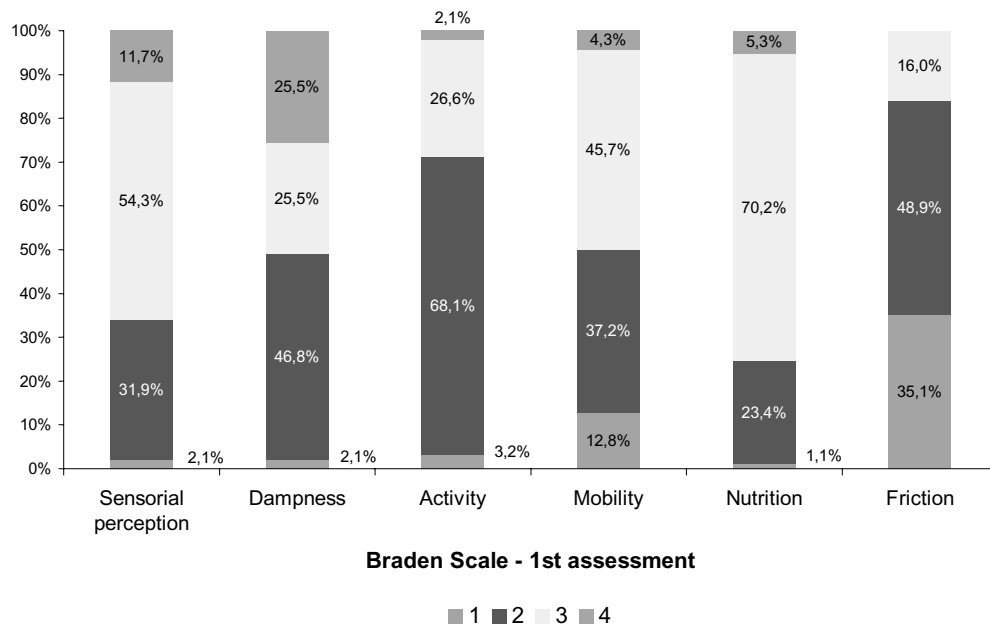


Figure 1 - Braden's sub-scale score rates, on the 1st assessment

Figure 1 shows that, on the 1st risk assessment of the 94 elderly, the sub-scales *moisture* (very wet),

activity (restricted to wheelchair) and *friction and shearing* (potential problem) scored highest.

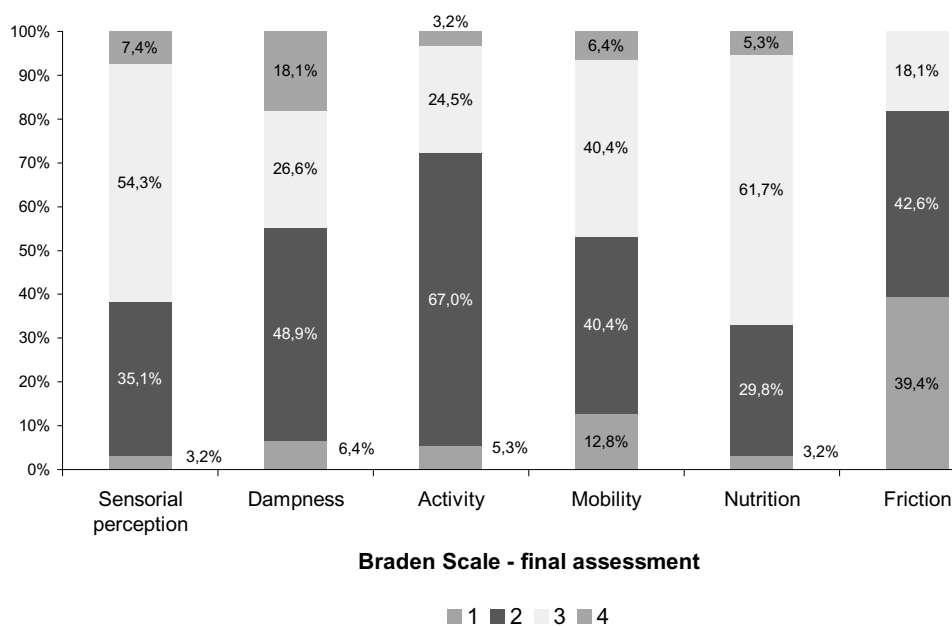


Figure 2 - Braden's sub-scale score rates, on the final assessment

The final assessment was different for each of the 94 elderly. It depended on the event that caused

the end of their participation in the study. On both the first and final assessments, the *mobility* sub-scale

showed the highest values for Cronbach's alpha (0.6591 and 0.6631). *Moisture* obtained the lowest Cronbach's alpha values (0.2001 and 0.3750), for the first and final assessments, respectively.

In terms of the risk factors present among elderly with and without PU, approximately 55% of those with PU have score 2 (very wet) on the *moisture* subscale, on the first assessment, showing a statistically significant difference when compared to those without PU ($p = .021$).

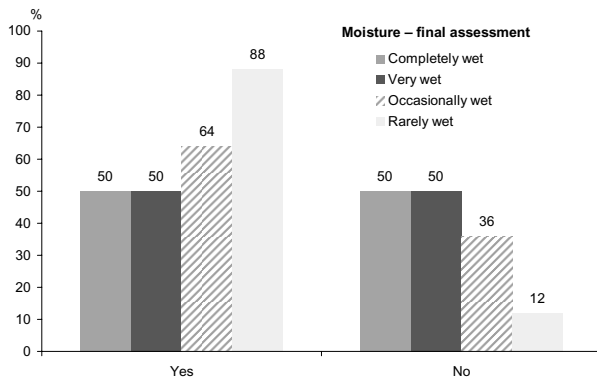


Figure 3 - Elderly with and without PU, according to moisture subscale scores on the final assessment

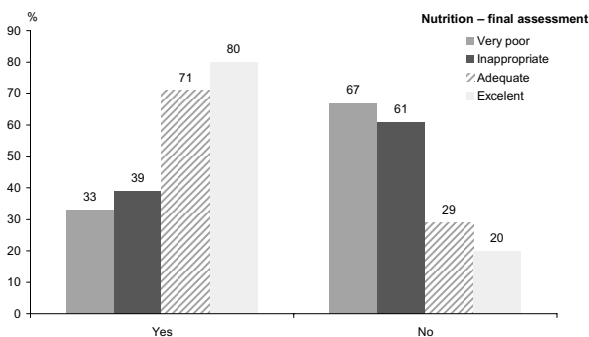


Figure 4 - Elderly with and without PU, according to nutrition subscale scores on the final assessment

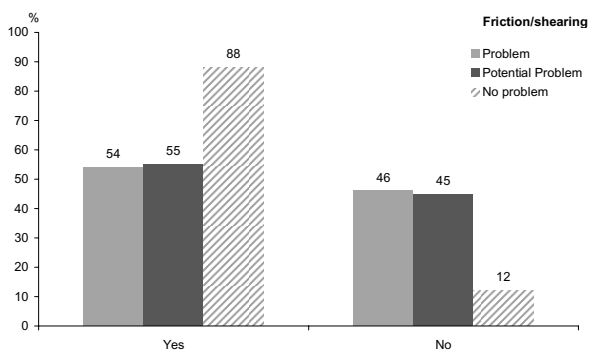


Figure 5 - Elderly with and without PU, according to friction and shearing subscale scores on the final assessment

Figures 3, 4, and 5 identify the categories of highest risk for elderly with PU, on the 3 Braden subscales: *moisture* (completely wet), *nutrition* (very poor and inadequate) and *friction and shearing* (problem and potential problem). All categories showed statistically significant differences when compared to the group of elderly without PU ($p = .034$; $p = .013$, and $p = .036$, respectively).

For the total Braden Scale score, results showed a statistically significant difference between the groups with and without PU, for both the first ($p = .030$) and final ($p = .001$) assessments. Logistic regression showed that female gender and previous PU were predictive factors for PU development (*odds ratio* of 3.46 and 2.76, respectively; $r^2 = .311$).

DISCUSSION

LSIE showed difficulties regarding elderly health maintenance, especially because they often presented organic system impairment, including the skin, due to the natural aging process, associated with chronic-degenerative diseases that cause various changes, making elderly weaker and more vulnerable⁽⁵⁾.

In addition, other changes, such as dementia, neuro-motor and muscular-skeletal impairments, also common among the elderly and often the cause of their institutionalization, limit their lifestyle, self care and activities. Therefore, this certainly affects their sensorial perception, mobility, activity, nutrition and moisture, as clinical factors of PU risk⁽³⁾.

Anal and urinary incontinence are former clinical situations that require specific approaches due to the involved prejudice, myths and taboos, which made diagnosis and treatment difficult. This led to permanent moisture and often turned these situations into the main reason for the elderly people's institutionalization.

This array of impairments and fragileness imply specific health care needs. These needs require human or physical support that is often possible only through institutionalization. However, as opposed to what is expected, institutionalization can increase these clients' dependence and lack of autonomy.

Since prevention is still the best medicine, this study aimed to investigate risk factors present in the institutionalized elderly.

Among the 275 residents in the four LSIE under study, 94 were included in the study sample, since they were at risk of developing PU. Most elders were white women, with an average age of 79 years. Hospitalization periods were long (average of 11 years and median of 5 years), which varies among LSIE.

Clinically, LSIE elderly were within normal nutritional standards, with none to six illnesses each, mostly urinary, cardiovascular and respiratory. The most frequent drugs used were neuroleptics and psychotropics. These conditions, associated with previous PU, which is the case of approximately one third of the elderly, in addition to *mobility* impairment - as the most important risk on both the first and final assessments - caused higher vulnerability to developing these lesions. Another study previously described the use of sedatives as a risk factor for PU development, since patients do not feel the need to change positions, thus compromising the mobility/activity factor⁽¹⁰⁾.

In this sense, during data collection, it was observed that the elderly developed few activities. They ate and slept, few performed occupational therapy and, despite being encouraged, they reported tiredness and lack of vitality. This led to a need for long rest periods, which affected activity and mobility levels.

Despite the prevalence of urinary diseases, as a general characteristic for the 94 studied elderly, there was no difference between the groups with and without PU. Nevertheless, *moisture* - being very wet - showed a statistically significant association with the presence of PU on both the first and final assessments. Excessive *moisture*, especially due to urinary incontinence, also relates with *friction and shearing*⁽¹¹⁾, which are common among elderly with PU, as a real or potential problem on the final assessment.

Anal and urinary incontinence are clinical situations that require specific approaches, since the resulting permanent moisture often turns these situations into the main reason for these people's institutionalization.

Though most elderly have a normal BMI, their food consumption - evaluated by the Braden nutrition subscale - was compromised. Very poor or inadequate *nutrition* was present in 51.3% of elderly with PU, which was significantly different from the group without PU. LSIE frequently report difficulties regarding independence to eat. A study that assessed the influence of BMI on the gluteal-ischiatic interface

pressure in a population of institutionalized elderly⁽¹²⁾ evidenced that pressure on this region was higher in thin elders with low BMI. Despite our findings, another study⁽¹³⁾ showed that every sub-scale, except *nutrition*, presented statistically significant associations that indicated the risk of ulceration.

Other authors⁽¹⁴⁾ describe hypoalbuminemia, low diastolic pressure, anal and urinary incontinence and peripheral edema as factors that cause PU among elderly in rehabilitation units. Not all these factors were investigated in the present study. Nevertheless, the presence of these co-morbidities is an important epidemiological fact for further coping with these conditions. In the referred study, Braden sub-scales were classified as primary risk factors; and age, edema and hypotension were considered secondary factors for developing PU. Results for primary factors were similar to those of the present study, for the same sub-scales: moisture, nutrition, friction and shearing.

It was observed that women and previous PU are predictive of PU occurrence, compared to men and elderly without previous lesions.

Among the surveyed studies, despite the prevalence of women in most, PU incidence was higher among men, with no epidemiological foundations for both findings. As for previous PU, only one of the studies⁽¹⁵⁾ reports the higher severity of elderly admitted with PU, indicating higher mortality.

The significant differences between total Braden Scale scores for elderly with and without PU, on the first and final assessments, always lower for the first group, confirm the importance of systematic risk assessment to implement early preventive measures.

In a study about this scale's predictive validity, the author⁽¹⁴⁾ demonstrated that scores decreased in every sub-scale when subjects had PU.

In another longitudinal prospective study⁽¹⁶⁾ about PU prevention methods in acute care hospital units, rehabilitation facilities and nursing homes, the authors showed that many PU prevention strategies were not being used in risk patients, emphasizing the importance of using validated systematic assessment instruments. Despite the limited number of LSIE investigated in this study, the results obtained and discussed show a reality very different from that of developed countries, where these instruments have been established and regularly used for over two decades^(8,10,14,16).

Finally, it should be stated that risk assessment - based on knowledge concerning specific factors - in addition to early prevention and intervention are crucial for approaching the threatening prevalence and incidence of PU in this population.

FINAL CONSIDERATIONS

Population aging, including in our country, has caused a significant increase in the so-called LSIE. These facilities are an alternative residence for elderly and all of them admit that they should undergo significant changes in structure and human resources over the next decades.

Regarding the elderly, it is observed that this generation did not have access to information like today. Perhaps this causes a passive approval of aging, different from today's adults, who seem to struggle to stop time. It is most likely that the vast majority is already concerned with how they will live the senescence phase. Nursing should make more use of these technological alternatives in the educational process of families and patients.

By knowing and detecting the prevailing risk factors of PU development in institutionalized elderly,

as well as their influence on sensorial perception, mobility, activity, moisture and friction and shearing, it is possible to elaborate and systemize prophylactic nursing and multidisciplinary measures.

Among the factors identified in this study, it should be recognized that *mobility* appeared to be one of the most important for the occurrence of PU. The multiple causality of these lesions, however, also shows that changes in sensorial perception - also due to continuous medication use, such as neuroleptics/psychotropics- as well as the identified illnesses, especially urinary - which compromise moisture and cause friction and shearing - confirm the characterization of a population that is highly vulnerable to developing these chronic lesions.

Elderly and caregivers, either professional or not, should be constantly instructed about the importance of and measures for pressure relief, reviewing and implementing simple procedures, such as changing decubitus, correctly using mobile sheets, sitting and lying positions, preventing movement friction, controlling moisture, as well as facilitating and encouraging eating and hydration; which is essential for the elderly, particularly when institutionalized.

REFERENCES

1. National Pressure Ulcer Advisory Panel [homepage on the Internet]. United States of America; [cited 2006 Apr 26]. Pressure Ulcer Definition and Etiology. Available from: <http://www.npuap.org/pressureulcerdef.html>
2. European Pressure Ulcer Advisory Panel [homepage on the Internet]. United Kingdom; [cited 2006 Apr 26]. Pressure Ulcer Treatment Guidelines. Available from: <http://www.epuap.org/gltreatment.html>
3. Braden BJ, Bergstrom NA. A conceptual scheme for the study of the ethiology of pressure sores. *Rehab Nurs* 1987 January-February; 12(1):8-12.
4. Nascimento LV. Dermatologia do idoso. In: Cucé LC, Festa CN. Manual de dermatologia 2ed. São Paulo: Atheneu; 2001. p.537-42.
5. Souza DMST, Santos VLCC. Úlceras por pressão e envelhecimento. *Rev Estima* 2006 janeiro-março; 4(1):36-44.
6. Sociedade Brasileira de Geriatria e Gerontologia (SBGG). Instituição de longa permanência para idosos: manual de funcionamento. Biênio 2002- 2003.
7. Bergstrom N, Braden BJ, Laguzza A, Holman V. The Braden Scale for predicting pressure sore risk. *Nurs Res* 1987 July-August; 36(4):205-10.
8. Ramundo JM. Reliability and validity of the Braden Scale in the home care setting. *J WOCN*. 1995 May; 22(3):128-34.

9. Cooper DM. Assessment, Measurement, and Evaluation: Their Pivotal Roles in Wound Healing. In: Bryant RA, organizadora. Acute & chronic wounds: nursing management. Missouri: Mosby; 2000.p.51-83.
10. Smith DM. Pressure ulcers in the nursing home. *Ann Intern Med* 1995 September 15; 123(6):433-42.
11. Maklebust J. Pressure ulcers: decreasing risk for old adult. *Geriatr Nurs* 1997 November-December; 18(6):250-4.
12. Kernozek TW, Wilder PA, Amundson A, Hummer J. The effects of body mass index on peak seat-interface pressure of institutionalized elderly. *Arch Phys Med Rehabil* 2002 June; 83(6):868-71.
13. Bergquist S. Subscales, subscores, or summative score: evaluating the contribution of Braden Scale items for predicting pressure ulcer risk in older adults receiving home health care. *J WOCN* 2001 November; 28(6):279-89.
14. Schue RM, Langemo DK. Prevalence, incidence and prediction of pressure ulcers on a rehabilitation unit. *J WOCN* 1999 May; 26(3):121-9.
15. Brandeis GH, Morris JN, Nash DJ, Lipsit L. The epidemiology and natural history of pressure ulcers in elderly nursing home residents. *JAMA* 1990 December 12; 264(22):2905-9.
16. Pieper B, Sugrue M, Weiland M, Sprague K, Heimann C. Presence of pressure ulcer prevention methods used among patients considered at risk versus those considered not at risk. *J WOCN* 1997 July; 24(4):191-9.