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Risk assessment for pressure ulcer in critical patients

AVALIAÇÃO DE RISCO PARA ÚLCERA POR PRESSÃO EM PACIENTES CRÍTICOS

EVALUACIÓN DE RIESGO PARA ÚLCERA POR PRESIÓN EN PACIENTES CRÍTICOS

Flávia Sampaio Latini Gomes[1], Marisa Antonini Ribeiro Bastos[2], Fernanda Penido Matozinhos[3], Hanrieti Rotelli Temponi[4], Gustavo Velásquez-Meléndez[5]

ABSTRACT

Bedridden patients are in risk to developing pressure ulcers and represent a priority group to be studied to identify this condition. To reach this goal, specific instruments are used to assess this problem. The objective of this study was to analyze the risk factors to developing pressure ulcers in adult patients hospitalized in ICUs. This is a sectional analytical study, in which evaluations were performed on 140 patients, hospitalized in 22 ICUs, using the Braden scale. Results showed that patients hospitalized from 15 days or more showed some level of risk. The highest frequencies of pressure ulcers were found in patients in the following categories: sensorial perception (completely limited), moistness (constantly moist), mobility (completely immobilized), activity (bedridden), nutrition (adequate) and friction and shear (problem). In conclusion, the use of this scale is an important strategy when providing care to patients in intensive treatment.

RESUMO

Pacientes acamados apresentam risco de desenvolver úlceras por pressão e representam um grupo prioritário para o estudo e identificação deste agravo. Para tal, utilizam-se instrumentos de avaliação específicos para o problema. O objetivo deste estudo foi analisar os fatores de risco para o desenvolvimento de úlcera por pressão em pacientes adultos internados em CTIs. Trata-se de um estudo seccional analítico no qual foram avaliados 140 pacientes, internados em 22 CTIs, utilizando-se a escala de Braden. Os resultados mostraram que pacientes internados por 15 dias ou mais apresentavam alguma categoria de risco. As maiores freqüências de úlcera por pressão foram encontradas em pacientes que estavam nas categorias: percepção sensorial (completamente limitado), umidade (constantemente úmida), mobilidade (completamente imobilizado), atividade (acamado), nutrição (adequado) e fricção e cisalhamento (problema). Conclui-se que a utilização dessa escala traduz-se em estratégia importante no cuidar de pacientes em terapia intensiva.

RESUMEN

Los pacientes internados presentan riesgo de desarrollar úlceras por presión y representan un grupo prioritario para el estudio e identificación de este agravamiento. A tal fin, se utilizaron instrumentos de evaluación específicos. El estudio objetivó analizar los factores de riesgo para el desarrollo de úlcera por presión en pacientes adultos internados en CTIs. Estudio seccional analítico, fueron evaluados 140 pacientes internados en 22 CTIs, usándose la Escala de Braden. Los resultados mostraron que pacientes internados por 15 días o más presentaban alguna categoría de riesgo. Se encontró mayor frecuencia de úlceras por presión en pacientes de las categorías: percepción sensoria (completamente limitado), humedad (constantemente húmeda), movilidad (completamente inmovilizado), actividad (en cama), nutrición (adecuado) y fricción y descamado (problema). Se concluye en que la utilización de la escala se traduce en estrategia importante en el cuidado de pacientes en terapia intensiva.

DESCRIPTORS
Pressure ulcer
Risk assessment
Intensive Care Units
Nursing

DESCRITORES
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DESCRIPTORES
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INTRODUCTION

In general, intensive care patients are at high risk of development pressure ulcers (PU), due to environmental and psychobiological limitations, such as: hemodynamic instability, movement restriction for extended periods and use of sedative and analgesic drugs, which decrease sensory perception and impair mobility[1-3]. These patients represent a priority group to study and identify the occurrence of these ulcers. This identification is achieved through specific instruments to assess the problem, such as risk scales. The predictive value of a diagnostic test or risk scale, however, depends on the prevalence of the condition in the target population. Hence, in case of high prevalence levels, the probability that a positive test will better predict the condition increases[4].

Some predictive scales have been developed to assess and identify patients at risk of developing pressure ulcer[1,5]. Some requisites should be taken into account when choosing a risk assessment method, such as: effectiveness, high sensitivity and specificity, easy application of the measurement instrument and presence of clear and defined criteria[6-7].

Today, the instruments by Norton, Gosnell, Waterlow and Braden are the best-known scales. The latter, created in the United States in 1987, went through validation and adaptation to Portuguese and was also adapted to the pediatric population in the Braden Q version. This scale has been the most used and widely tested so far[4,8-9], as it shows the best operational definition and demonstrates higher sensitivity and specificity levels than other scales, as it serves to assess six risk factors (sub-scales) in the client[1-2,5,10].

...even in patients with pressure ulcers, risk assessment can continue, as the occurrence of ulcers in other sites can be prevented.

It should be highlighted that, even in patients with pressure ulcers, risk assessment can continue, as the occurrence of ulcers in other sites can be prevented.

This study was developed to get to know the occurrence and risk factors related to pressure development in adult patients hospitalized at Intensive Care Units (ICUs) in Belo Horizonte, Brazil.

OBJECTIVE

Analyze risk factors for the development of pressure ulcers in adult patients hospitalized at ICUs in Belo Horizonte.

METHOD

A cross-sectional and analytic study was carried out. Descriptive cross-sectional studies estimate the prevalence or occurrence of a given event. In cross-sectional analytic studies, besides the occurrence, associations between events are investigated. It is known, however, that conclusions reached through *analyses in these studies are restricted to relations of associations, instead of causality*[11].

The population comprised patients who complied with the following inclusion criteria: aged 18 years or older, hospitalization until 24h on the day before data collection, in the 316 beds distributed across 22 ICUs of 15 public and private hospitals in Belo Horizonte, Minas Gerais, which also provided Supplementary Health Services. Epi Info 6.0 software was used for sorting and calculating the sample size, according to the following parameters: 30% expected prevalence of pressure ulcer, 6% error level, 95% confidence level and 80% power, in a universe of 316 beds available for the study. In line with these parameters, the sample should comprise 134 individuals. Forty percent was added for possible losses and analyses with more than two variables, resulting in an estimated 187 patients. Out of 187 beds sorted, 33 were empty at the time of data collection. Among the 154 other patients, 14 were not available for the study, for the following reasons: five refused to participate in data collection, three had been hospitalized for less than 24 hours, two could not be manipulated and assessed, two were under 18 years of age and two were not assessed in terms of risk. Thus, the final sample contained 140 patients.

The study variables were: age, gender, skin color, total hospitalization time and ICU hospitalization time. Sensory perception, moisture, activity, mobility, nutrition and friction and shear variables were used according to the Braden scale.

Data were collected in July 2007. Therefore, 11 nurses were previously trained for clinical examination, identification, staging and location of PU and the application of the Braden scale and, at the end, the agreement level (Kappa index) between the nurses and supervisor was verified, in which all nurses scored more than 90%, and were hence considered apt. Among eleven nurses who received training, nine participated in data collection.

For data collection, a form was used with questions about the institution, person, socio-demographic profile and clinical data; Braden Risk Scale score, number, staging and location of pressure ulcers, besides previously used measures.

The Braden scale, adapted and validated in Brazil[9], is based on the physiopathology of pressure ulcers and permits assessing important aspects of ulcer formation, according to six parameters or subscales: *sensory perception* measures the individual ability to feel and report discomfort; *moisture* measures the degree to which the skin is exposed to moisture; *mobility* and *activity* assess the frequency and duration of activity, besides position changes; *nutrition* reflects the food intake pattern of the assessed person, as well as liquid supplements; *friction and shear* assess the person's ability to keep the skin free from contact with the

bed during positioning or movements. Each of these parameters is rated from 1 to 4, except for *friction and shear,* which ranges from 1 to 3.

The maximum score is 23 and the minimum 6; risk classification ranges are as follows: 15 to 18, mild risk; 13 to 14, moderate risk; 10 to 12, high risk; and below 9, very high risk. Hence, the lowest scores indicate worse conditions.

Statistical Package for Social Science – SPSS software, version 15.0 was used for data processing and analysis. PU frequencies were calculated for each subscale and the association model between the Braden scores, distributed in three categories (mild and no risk; moderate risk and high and very high risk) and PU occurrence was constructed. This association model was adjusted by the hospitalization time variable. Co-variables with significance below 0.20 (p value < 0.20) during bivariate analysis were considered candidates for the final model.

Stepwise multivariate logistic regression was used to adjust for potentially confounding variables, in which the presence of pressure ulcer served as the response variable and associations with all independent variables were estimated. In the final model, significantly associated variables in bivariate analysis were included in decreasing order of significance. The decision to keep a variable in the model or not was based on significance calculation with or without the variable in the model. Confusion and interaction between variables were also tested. The strength of associations was assessed through the odds ratio (OR) and respective 95% confidence intervals (CI95%). The statistical significance level set in this phase was 5% (p value = 0.05).

Previous authorization was obtained from all hospital institutions, as well as approval from the Institutional Review Board at *Universidade FUMEC* (Opinion No 265/2007). Patients or responsible persons were asked to read and sign the Informed Consent Term to participate in the study.

RESULTS

The sample included 140 patients: 75 (54%) men and 65 (46%) women; 90 were over 60 years of age (64%) and white (65%) (p > 0.05).

The variable hospitalization time comprised two parts: the patient's total hospitalization time at the health institution was verified, independently of the hospitalization unit; and specifically the hospitalization time at the ICU. Thus, the mean total hospitalization time was 18 days, with 67% of patients hospitalized between 1 and 15 days, 14% between 16 and 30 days, and 19% for more than a month. As for total hospitalization time at the ICU, the mean time was 13 days, with 77% of patients hospitalized between 1 and 15 days, 14% between 16 and 30 days and 9% for more than a month.

With regard to the participating institutions, at one of the hospitals, all sorted ICU beds were empty at the time of data collection; 67.0% were empty at another hospital and 44% at two others. At four hospitals, all sorted beds were occupied.

The 140 patients' mean Braden scores were 13.86 (sd = 4.75); according to gender, the mean score was 14.13 (sd = 4.63) for men and 13.56 (sd = 4.91) for women, without statistically significant differences (p = 0.48). According to age, the mean scores were 15.22 (sd = 4.41) for patients younger than 60 and 13.03 (sd=4.79) for patients aged 60 years or older, with a statistically significant difference (p = 0.00).

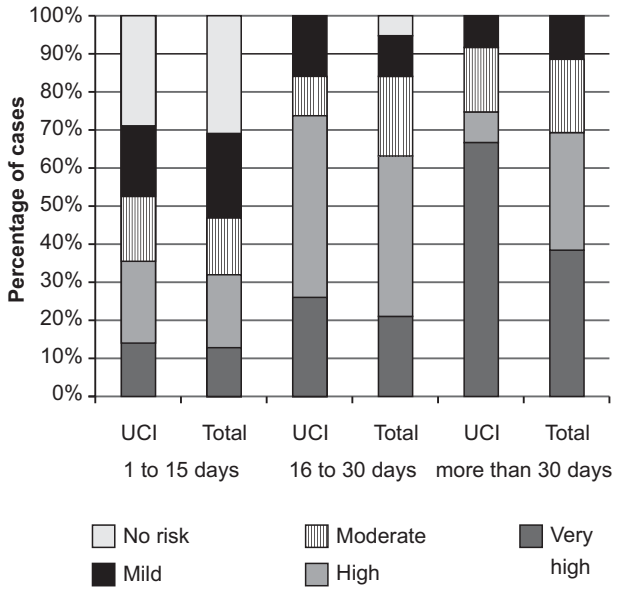

Figure 1 - Risk category for pressure ulcer development, according to ICU hospitalization time and total hospitalization time - Belo Horizonte - 2007

Figure 1 demonstrates that, in the first two weeks of total or ICU hospitalization time, practically 70% of patients showed some risk for pressure ulcer, with similar risk profiles. When considering total hospitalization times between 16 and 30 days alone, 95% of patients demonstrated some risk for pressure ulcer development and, when hospitalized for more than 30 days, all patients presented mild to high risks.

As from the fifteenth hospitalization day, all ICU patients revealed some risk for the development of pressure ulcer. Between 16 and 30 days of ICU hospitalization, 74% of patients showed high (47%) and very high risk (26%) and, after the first month of hospitalization, there are more patients with very high (67%) than with high risk (8%).

As for risk classification according to **sensory perception**, a higher score percentage (41.0%) was observed for *no impairment*. The same was true for *rarely moist* (49.0%) in the **moisture** parameter, which suggests that the assessed patients were in better conditions regarding these aspects. On the other hand, **activity** and **friction and shear** parameters showed the highest score percentages for items that

represent worse conditions, i.e. *bedfast* (69.0%) and *problem* (57.0%), evidencing that patients stayed in bed, were dependent for moving and that their skin was more exposed to friction (Figure 2).

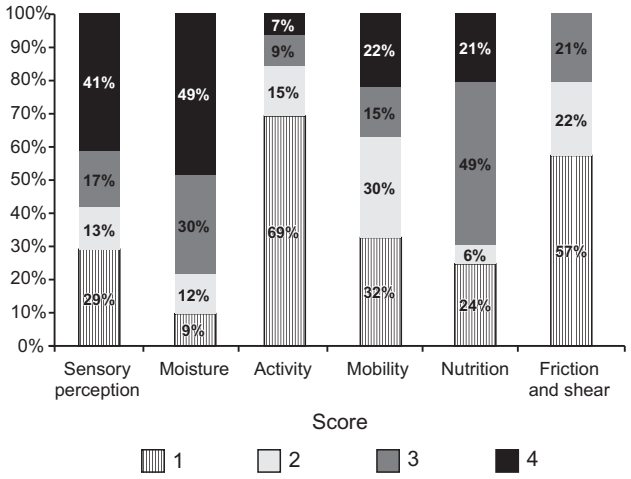

Figure 2 - Relative score frequencies (1 to 4) on Braden sub-scales among study patients - Belo Horizonte - 2007

In Table 1, the critical patients' highest risk parameters on the sub-scales can be identified: sensory perception (*completely limited*), moisture (*constantly and very moist*), activity (bedfast), mobility (*completely immobile and very limited*), nutrition (*adequate*) and friction and shear (*problem*).

In the activity parameter, all patients (100.0%) assessed as *walks occasionally* and *walks frequently* showed no ulcers (*p*=0.00).

As for patients with intact sensory perception and mobility (*no limitation* on both) and recommended nutritional aspects (*excellent*), a very small proportion of pressure ulcers was found.

Table 1 - Occurrence of pressure ulcer or not according to Braden subscales - Belo Horizonte - 2007

Sub-scale scores	Pressure ulcer				*p*
	Yes		No		
	N	%	N	%	
Sensory perception					0.00
Completely limited	13	56.50	27	23.10	
Very limited	4	17.40	14	12.00	
Slightly limited	5	21.70	19	16.20	
No impairment	1	4.30	57	48.70	
Moisture					0.00
Constantly moist	7	30.40	6	5.20	
Very moist	4	17.40	12	10.40	
Occasionally moist	9	39.10	33	28.70	
Rarely moist	3	13.00	64	55.70	
Activity					0.16
Bedfast	19	82.60	76	66.10	
Chairfast	4	17.40	17	14.80	
Walks occasionally	0	0.00	13	11.30	
Walks frequently	0	0.00	9	7.80	
Mobility					0.00
Completely immobile	16	69.60	29	25.00	
Very limited	6	26.10	36	31.00	
Slightly limited	1	4.30	20	17.20	
No limitation	0	0.00	31	26.70	
Nutrition					0.00
Very poor	3	13.00	31	26.70	
Probably inadequate	1	4.30	7	6.00	
Adequate	19	82.60	49	42.20	
Excellent	0	0.00	29	25.00	
Friction and shear					0.00
Problem	22	95.70	57	49.10	
Potential problem	1	4.30	30	25.90	
No apparent problem	0	0.00	29	25.00	

Table 2 - Odds Ratio (OR) and 95% Confidence Intervals (CI95%) for pressure ulcer in patients hospitalized at ICUs - Belo Horizonte - 2007

Variable	Hospitalization at ICUs			Total hospitalization (ICU and nursing wards)		
	OR	CI 95%	*p* value	OR	CI 95%	*p* value
Braden Scale						
Mild and no risk	1	-		1	-	
Moderate risk	5.54	1.36 - 22.49	0.017	3.80	1.00 - 14.37	0.049
High and very high risk	11.60	3.56 - 37.74	0.000	7.36	2.37 - 22.86	0.001

Table 2 shows the association model between Braden score categories and PU presence. Scale ratings corresponding to moderate and high risk were strongly associated with PU presence, both when considering ICU hospitalization time (OR=5.54; OR=11.60) and total hospitalization time (OR=3.80; OR=7.36). These results were adjusted for hospitalization time.

DISCUSSION

Although that goes beyond the study aims, it was observed that the Braden scale is a valid risk prediction instrument for the development of pressure ulcer in adult hospitalized patients, in line with other studies on the theme[3,5,7,10].

In the study sample, an association was found between age (≥ 60 years) and low mean scale ratings (13.0), i.e. elderly patients were at risk of developing these ulcers as, for people over 60 years of age, anyone scoring 17 or less is considered at risk[8]. These data coincide with literature findings, which reveal higher PU incidence levels in patients over 60, with skin alterations like: decreased vascularization and properties like pain perception and inflammatory reaction, characteristic of old age. Besides, a rise in the probability of chronic illnesses is verified, which increases susceptibility to the development of pressure ulcers[3,12]. Although the elderly population is more prone to pressure ulcer development and 70% of all PU due to this etiology is found in this age group, the association of age did not continue in the final model[13].

An association was verified between total hospitalization time of more than 15 days and moderate to high risks for pressure ulcer development, mainly in patients with longer ICU hospitalization times. All patients hospitalized at ICUs for more than 15 days presented some risk, ranging from mild to moderate, to develop PU. Therefore, a bivariate model adjusted by hospitalization time was used. It is known that, in acute hospital care, with shorter hospitalization times, pressure ulcer occurrence levels correspond to 3%, against 45% in clinical hospitals, and possibly higher rates at intensive care units[14]. Braden Scale rating categories showed to be strongly associated with the presence of pressure ulcer, more intense in patients at High and Very High Risk, and even higher when hospitalization referred to the ICU.

Most pressure ulcers were identified in patients at risk in the following categories: sensory perception (*completely limited*), moisture (*constantly* and *very moist*), activity (*bedfast*), mobility (*completely immobile*), nutrition (*adequate*) and friction and shear (*problem*).

In the scale, the *adequate* nutrition parameter applies to any patient who

> [...] eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) per day. Occasionally will refuse a meal, but will usually take a supplement when offered; or is on a tube feeding or Total Parenteral Nutrition regimen which probably meets most of nutritional needs[9].

As most sample patients were on tube feeding or total parenteral nutrition, the number of assessments regarding this item was higher, without picturing reality however. ICU patients' nutritional status tends to be compromised, due to factors like malnutrition, pathological conditions and surgeries[2]. In the short and long terms, nutritional problems can predispose patients to pressure ulcer development. Malnutrition can cause alterations in the inflammatory phase and tissue regeneration, as well as increased risk of infection, sepsis and death[15]. It should be highlighted that the nutritional aspect assessed by the Braden scale is limited, as it assesses intake but not nutritional status[2]. Therefore, other factors should be included in the assessment, such as oral health, appetite, oral history, gastrointestinal history and recent weight gain or loss, among others[8].

The relation between the presence of pressure ulcer and care quality has been reported for a number of years, and even designated as iatrogenesis. Literature data suggest, however, that pressure ulcers can be an indicator of care quality, although not always. Until date, there is a lack of clinical research on the disappearance of all pressure ulcer, although some studies present a drastic drop in these ulcers after aggressive preventive interventions[16].

These and other Brazilian research results[2,9,17] reveal that the systematic use of the Braden scale represents an important strategy in care delivery to intensive care patients. Health professionals, however, should be made aware of the range of this problem, have updated knowledge on the theme and be apt to establish related diagnoses. Most pressure ulcers could be avoided if these professionals had greater knowledge on risk assessment scales and the main characteristics of patients who are most susceptible to PU development[3].

In risk assessment, all bedfast or chairfast patients should be considered *at risk* for pressure ulcer, as well as anyone unable to change positions; a risk assessment instrument should be selected and used, guaranteeing systematic assessment of each person's risk factors; all patients *at risk* should be assessed upon admission, and then at regular intervals; and all risk factors should be assessed for each patient, so as to guide prevention measures[8].

Pressure ulcer knowingly represents one of the main complications among critical patients, is hard, generally long and burdensome to treat, supporting the premise of prevention[3]. Hence, when confronted with patients at risk for pressure ulcer development, the multiprofessional team is responsible for putting in practice prevention measures to decrease the impact of this problem.

Despite the associations shown in this research, the study design does not guarantee the temporality of the identified associations. Besides, as this is a sampling study, its representativeness for ICU patients in the city of Belo Horizonte is highlighted.

CONCLUSION

Through this study, it could be concluded that risk ratings on the Braden scale adjusted for hospitalization time were associated with the development of pressure ulcers. The importance of using the Braden scale in clinical practice is highlighted, as a very useful instrument to predict pressure ulcer development or recurrence. The use of this instrument permits knowledge on patients' individual risks and the early establishment of preventive nursing actions in line with these risks.

REFERENCES

1. Sousa CAC, Santos I, Silva LD. Apropriação de concepções de Neuman e Braden na prevenção de úlceras de pressão. Rev Enferm UERJ. 2004;12(2):280-5.
2. Fernandes LM, Caliri MHL. Uso da escala de Braden e de Glasgow para identificação do risco para úlceras de pressão em pacientes internados em Centro de Terapia Intensiva. Rev Lat Am Enferm. 2008;16(6):973-8.
3. Blanes L, Duarte IS, Calil JA, Ferreira LM. Avaliação clínica e epidemiológica das úlceras por pressão em pacientes internados no Hospital São Paulo. Rev Assoc Med Bras. 2004; 50(2):182-7.
4. Smith LN, Booth N, Douglas D, Robertson WR, Walker A, Durie M, et al. A critique of "at risk" pressure sore assessment tools. J Clin Nurs. 1995;4(3):153-9.
5. Aguiar JM, Paiva SS. Escala de Braden: avaliação dos fatores de risco para úlcera de pressão em pacientes internados em uma Unidade de Terapia Intensiva. Rev Hosp Univ UFMA. 2003;1(1/2):39-44.
6. Moreno-Pina JP, Richart-Martínez M, Guirao-Goris JA, Duarte-Climents G. Análisis de las escalas de valoración del riesgo de desarrollar una úlcera por presión. Enferm Clin. 2007; 17(4):186-97.
7. Defloor T, Grypdonck MFH. Pressure ulcers: validation of two risk assessment scales. J Clin Nurs. 2005;14(3):373-82.
8. Ratliff CR, Bryant DE. Guideline for prevention and management of pressure ulcers. Glenview: Wound, Ostomy and Continence Nurses Society; 2003.
9. Paranhos WY, Santos VLCG. Avaliação de risco para úlceras de pressão por meio da escala de Braden, na língua portuguesa. Rev Esc Enferm USP. 1999;33(1):191-206.
10. Pancorbo-Hidalgo PL, Garcia-Fernandez FP, Lopez-Medina IM, Alvarez-Nieto C. Risk assessment scales for pressure ulcer prevention: a systematic review. J Adv Nurs. 2006; 54(1):94-110.
11. Almeida Filho N, Rouquayrol MZ. Epidemiologia e saúde. 6ª ed. Rio de Janeiro: Medsi; 2003.
12. Souza DMST, Santos VLCG. Fatores de risco para o desenvolvimento de úlceras por pressão em idosos institucionalizados. Rev Lat Am Enferm. 2007;15(5):958-64.
13. Donini LM, De Felice MR, Tagliaccica A, De Bernardini L, Cannella C. Comorbidity, frailty, and evolution of pressure ulcers in geriatrics. Med Sci Monit. 2005;11(7):326-36.
14. Amlung SR, Miller WL, Bosley LM. The 1999 National Pressure Ulcer Prevalence Survey: a benchmarking approach. Adv Skin Wound Care. 2001;14(6):297-301.
15. Pieper B. Mechanical forces: pressure, shear, and friction. In: Bryant RA, Nix DP. Acute and chronic wounds: current management concepts. 3rd ed. St. Louis: Mosby; 2007. p. 205-34.
16. Thomas DR. Prevention and treatment of pressure ulcers. J Am Med Dir Assoc. 2006;7(1): 46-59.
17. Rogenski NMB, Santos VLCG. Estudo sobre incidência de úlceras por pressão em um hospital universitário. Rev Lat Am Enferm. 2005;13(4):474-80.

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