Emanuelly Wedja do Nascimento Lima e Silva[1], Raquell Alves de Araújo[1], Elizandra Cássia de Oliveira[2], Viviane Tannuri Ferreira Lima Falcão[3]

Applicability of a pressure ulcers protocol in intensive care unit

Aplicabilidade do protocolo de prevenção de úlcera de pressão em unidade de terapia intensiva

1. Resident Nurse in Intensive Care of Hospital da Restauração da Secretaria Estadual de Saúde, Recife (PE), Brazil.
2. Nurse of the Intensive Care Unit of Hospital da Restauração da Secretaria Estadual de Saúde - Recife (PE), Brazil.
3. MSc, Vice-Director of Faculdade de Enfermagem Nossa Senhora das Graças – FENSG – UPE, Recife (PE), Brazil.

Author for correspondence:
Raquell Alves de Araújo
Rua João Lira, 143, apt. 141 - Boa Vista
Zip Code: 50050-550, Recife (PE), Brazil.
Phone: + 55 (81) 8649-3266
E-mail: raquellcatunda@gmail.com

ABSTRACT

Objective: The avoidance of pressure ulcers development in critically ill patients is a major nursing challenge. Prevention is thus relevant for assurance of high quality care. This study aimed to evaluate the applicability of the Braden scale in intensive care unit patients.

Methods: This was a prospective study based which evaluated all adult patients staying in the intensive care unit from July 14 to August 10, 2009. The data were collected using the Braden's scale by three examiners who identified the pressure ulcer development risk. The data were analyzed using the SAS Statistical Software. For determination of the examiners' rates degree of coincidence, the Kappa value was used (95%CI).

Results: Regarding the related risk factors: 36.4% had mild sensory perception impairment; 50.9% had occasionally moist skin; 97.3% bedfast; 39.1% had very limited mobility; 45% probably had inappropriate nutrition; 61.8% had friction and shear problems. An agreement between the examiners was identified for nutrition and physical activity (38.1% to 100.0%); the Kappa population zero hypothesis was rejected; a paired examiners agreement (41.7% to 100.0%) was identified for the items humidity and physical activity, and the Kappa values ranged from 0.13 to 1.

Conclusions: These intensive care patients were identified to have increased risk of developing pressure ulcers. This tool was considered appropriate to support the implementation of preventive measures.

Keywords: Validation studies; Protocols; Pressure ulcers/prevention & control; Pressure ulcer/nursing; Intensive care

INTRODUCTION

Pressure ulcer (PU) in defined as any change in the skin integrity, due to not-relieved soft tissues compression between bony prominences and a hard surfaces,[1] and is a common complication in severely ill patients, causing and high impacts to the quality of life recovery.

PU development risk factors are: immobility, malnutrition, anemia, edema, drug vasoconstriction, consciousness level changes, incontinences and vasculopathies. Pressure ulcer leads to additional problems such as pain, suffering and increased morbidity and mortality, prolongs the time of stay in the hospital and increases the hospitalization expenditures.[2]

The job of intensive care unit (ICU) nursing is focused on the se-

verely ill patient care and evaluation from a humanistic quality of life driven perspective including the condition diagnosis, interventions and specific nursing measures. Identification of patients in risk of developing PU depends not only on the professional's clinical ability, but also on measuring instruments, such as an evaluation scale which have appropriate predictive, sensitivity and specificity values.[1]

Aiming to provide additional support for constant professional care improvement and ability increase for PU risk evaluation and prevention, several authors have proposed measuring instruments or risk evaluation scales. The scales of Norton, Gosnell, Waterlow and Braden are the most frequently used in the Americas and Europe; these have different scope, complexity and use easiness.[3]

In Brazil, the Braden's scale was translated into Brazilian Portuguese and validated in 1999 according to the work by Paranhos and Santos, and is the best operationally defined, with a high predictive value of PU development, allowing the evaluation of several PU-related factors, and its use requires the evaluator to thoroughly evaluate the patient's condition.[1]

In this context, this study aimed to evaluate the Braden's scale applicability, considering that the instrument implementation by nurses can make possible best evaluation of pressure ulcers risk, which in turn may determine changes in the care measures and lower de novo cases incidence (Appendix 1).

METHODS

This was a transversal descriptive study developed in a Public Hospital's ICU located in Recife city (Brazilian Northeast) from July 14 to August 10, 2009. The data were collected using an ICU pressure ulcer prevention protocol (Appendix 2) based on the Braden's scale (Appendix 3). To verify the instrument reproducibility, it was decided to use three experienced professional examiner nurses as judges, evaluating the instrument's content, presentation, clarity and understanding.

The completed forms were identified with the characters A, B or C, in order to differentiate among the evaluators. The assessment was made in a two-day pre-established routine, always by the same time (by the morning, at the bath time) when the examiners applied the protocol simultaneously but individually, so the results could be as reliable as possible. The examiners had no access to each other evaluation. A 70% value was established for reliability determination, to allow its evaluation by an agreement analysis.

In the data analysis were calculated the absolute distributions, percents and the statistical measurements: mean, median, standard deviation, variation coefficient (minimal and maximal values), the Kappa value for evaluation of the degree of agreement between the examiners (descriptive statistics techniques) and inferential statistics for the Kappa value confidence interval determination. By means of this, it was possible to check the hypothesis that the population Kappa would be or not equal to zero. This test is useful to check if two examiners' evaluations are different. The Kappa score ranges between -1.0 and +1.0, and when it is equal to one this indicates a perfect agreement between the examiners and zero means random categorization or examiners' independence; the closer to 1, more coincidental are the evaluations, and the closer to -1, less coincidental. When this index is equal to -1.00, no evaluation is coincident.[4]

For the Kappa scores interpretation the following scale was suggested: < 0.20: poor; 0.21 – 0.40: weak; 0.41 – 0.60: moderate; 0.61 – 0.80: good; 0.81 – 0.99: excellent; 1.00: perfect. The significance level for the statistical tests was 5%. The data were entered in an Excel sheet and the SAS 8.0 software was used for the statistical calculations.

The data collection was only started after receiving the Institution's Ethics Committee approval, document number 071/08. Signature of an Informed Consent Form was also required, either by the patient or a family member, according to the Resolution 196/96 of the Brazilian National Health Council.

RESULTS

During the study period, 34 patients were admitted to the ICU, and 13 of them (38.24%) already had PU by the admission time, thus being excluded from the sample, leaving remainder 21 patients (61.76%). The table 1 shows that the predominant age was 51 years or more (38.1%); 42.9% patients were male, and 57.1% female. The studied patients were shown to have high (57.3%) and moderate risks (28.2%) of PU development,

according to the Braden's scale PU risk evaluation (Table 2).

Regarding sensory perception of appropriate response to pressure-related discomfort, most of the patients were completely limited (29.0%) or slightly limited (36.4%). Most of the studied patients had occasionally (50.9%) or rarely (26.4%) moist skin. Regarding the degree of physical activity, most of the patients were bedfast (97.3%), as expected for an ICU patients' sample. Regarding mobility, most of the patients were very limited (39.1%) or completely immobile (34.6%). Probable inappropriate nutrition was seen for 45% of the patients. Regarding friction and shear, most needed moderate or maximum assistance to move (61.8%).

Among the 21 responses for each of the Braden's scale items, on each examiner's first evaluation, it was possible to identify a coincidences frequency ranging from 8 (38.1%) to 21 (100.0%). The most frequent coincidences were found for the "physical activity" item, with at least 20 coincidences and the less frequent coincidence was seen for the examiners 2 and 3 on the nutrition item. For the items where the Kappa could be calculated, the values ranged from 0.19 to 1.00. Except for an interval including the 0.00 value, for the remainder intervals the hypothesis of a null population Kappa was rejected for the adopted significance level (Table 3).

The table 4 shows the agreement results for the pairs of examiners, including the subsequent evaluations performed in 15 of the 21 patients, totalizing 36 evaluations. The coincidences frequency ranged from 15 (41.7%) to 36 (100.0%), being the higher frequency for physical activity, with at least 20 coincidences. The lower coincidence was

between examiners 2 and 3 for moisture. The Kappa values for the items that could be determined ranged from 0.13 to 1.00. Except for an interval including the 0.00 value, for the remainder intervals the hypothesis of null population Kappa value was rejected.

Table 2 – Braden's scale items evaluation by the three examiners

Variable	N	%
Sensory perception		
Completely limited	32	29.0
Very limited	30	27.3
Slightly limited	40	36.4
No impairment	8	7.3
Total	110	100.0
Moisture		
Constantly moist	-	-
Very moist	25	22.7
Occasionally moist	56	50.9
Rarely moist	29	26.4
Total	110	100.0
Activity		
Bedfast	107	97.3
Chairfast	3	2.7
Walks occasionally	-	-
Walks frequently	-	-
Total	110	100.0
Mobility		
Completely immobile	38	34.6
Very limited	43	39.1
Slightly limited	27	24.5
No limitation	2	1.8
Total	110	100.0
Nutrition		
Very poor	19	17.4
Probably inadequate	49	45.0
Adequate	41	37.6
Excellent	-	-
Total	109	100.0
Friction and shear		
Problem	68	61.8
Potential problem	42	38.2
No apparent problem	-	-
Total	110	100.0
Risk categorization		
High	63	57.3
Moderate	31	28.2
Low risk	16	14.5
No risk	-	-
Total	110	100.0

Source: UTI – HR (2008).

Table 1 – Distribution of the evaluation results of non-pressure ulcer intensive care unit patients' by age and gender

Variable	N	%
Age (years)		
Up to 29	7	33.3
30 to 50	6	28.6
51 or more	8	38.1
Gender		
Male	9	42.9
Female	12	57.1
Total	21	100.0

Source: UTI – HR (2008).

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Table 3 – Between examiners Braden scale agreement analysis for the first evaluation

Variable	Examiners	N	Coincidence		Kappa	95% CI
			N	%		
Sensory perception	E_1 vs E_2	21	16	76.2	0.64	(0.37 to 0.91)
	E_1 vs E_3	21	15	71.4	0.58	(0.31 to 0.86)
	E_2 vs E_3	21	11	52.4	0.32	(0.04 to 0.60)
Moisture	E_1 vs E_2	21	11	52.4	0.33	(0.07 to 0.58)
	E_1 vs E_3	21	12	57.1	0.31	(-0.02 to 0.63)
	E_2 vs E_3	21	10	47.6	0.23	(-0.04 to 0.49)
Physical activity	E_1 vs E_2	21	21	100.0	1.00	(1.000 to 1.000)
	E_1 vs E_3	21	20	95.2	**	**
	E_2 vs E_3	21	20	95.2	**	**
Mobility	E_1 vs E_2	21	15	71.4	0.56	(0.27 to 0.85)
	E_1 vs E_3	21	14	66.7	0.52	(0.23 to 0.80)
	E_2 vs E_3	21	11	52.4	0.32	(0.05 to 0.59)
Nutrition	E_1 vs E_2	21	14	66.7	0.51	(0.21 to 0.82)
	E_1 vs E_3	21	12	57.1	0.41	(0.13 to 0.70)
	E_2 vs E_3	21	8	38.1	0.19	(-0.03 to 0.41)
Friction and shear	E_1 vs E_2	21	19	90.5	0.80	(0.54 to 1.06)
	E_1 vs E_3	21	17	81.0	0.60	(0.26 to 0.94)
	E_2 vs E_3	21	15	71.4	0.42	(0.02 to 0.81)
Risk categorization	E_1 vs E_2	21	15	71.4	0.47	(0.16 to 0.79)
	E_1 vs E_3	21	15	71.4	0.54	(0.26 to 0.82)
	E_2 vs E_3	21	14	66.7	0.43	(0.13 to 0.73)

** - could not be determined due to different number of categories between the examiners. CI – confidence interval.

Table 4 – Between examiners Braden scale agreement analysis for the subsequent evaluations

Variable	Examiners	N	Coincidence		Kappa	95% CI
			N	%		
Sensory perception	E_1 vs E_2	36	24	66.7	0.52	(0.30 to 0.74)
	E_1 vs E_3	36	24	66.7	0.53	(0.32 to 0.75)
	E_2 vs E_3	36	22	61.1	0.45	(0.25 to 0.66)
Moisture	E_1 vs E_2	36	19	52.8	0.31	(0.10 to 0.53)
	E_1 vs E_3	36	22	61.1	0.34	(0.10 to 0.58)
	E_2 vs E_3	36	15	41.7	0.13	(-0.06 to 0.32)
Physical activity	E_1 vs E_2	36	36	100.0	1.00	(1.00 to 1.00)
	E_1 vs E_3	36	33	91.7	**	**
	E_2 vs E_3	36	33	91.7	**	**
Mobility	E_1 vs E_2	36	26	72.2	0.57	(0.35 to 0.79)
	E_1 vs E_3	36	24	66.7	**	**
	E_2 vs E_3	36	20	55.6	**	**
Nutrition	E_1 vs E_2	35	21	58.3	0.37	(0.12 to 0.63)
	E_1 vs E_3	35	23	63.9	0.44	(0.20 to 0.66)
	E_2 vs E_3	36	16	44.4	0.23	(0.06 to 0.40)
Friction and shear	E_1 vs E_2	36	31	86.1	0.70	(0.46 to 0.94)
	E_1 vs E_3	36	29	80.6	0.60	(0.33 to 0.86)
	E_2 vs E_3	36	28	77.8	0.53	(0.26 to 0.81)
Risk categorization	E_1 vs E_2	36	25	69.4	0.46	(0.23 to 0.69)
	E_1 vs E_3	36	28	77.8	0.64	(0.42 to 0.85)
	E_2 vs E_3	36	25	69.4	0.46	(0.22 to 0.70)

** - couldn't be determined due to the different number of categories between the examiners. CI – confidence interval.

DISCUSSION

The results show that the patients' age distribution was similar to the findings of Feijó,[5] who conducted a study in an University Hospital ICU in the Ceará state (Brazilian Northeast), with high prevalence of patients above 60 years old. Studies have shown that the skin becomes drier with age due to reduced number of sweat and sebaceous glands, and also hemodynamic changes and muscle atrophy rendering bony structures more prominent.[6]

Regarding the larger prevalence in females, demographic data have show that women live longer than men, and thus have longer chronic diseases courses. Additionally, there are differences in the attitudes towards diseases and physical incapacities. Women are generally more attentive to symptoms, know more about diseases and use more intensively the healthcare services than men. The early medical care is considered as one of the factors for best chronic diseases outcomes in women,[7] and this could explain the larger females proportion.

To evaluate the risk of developing PU in a given patient, the several predisposing factors should be taken into account. As highlighted by Fernandes,[8] "all aspects should be considered, since a pressure ulcer is not consequence of one single risk factor, but of the relationship between several risk factors and the patient", stressing the relevance of a validated risk-evaluation tool.

The lack of sensory perception leads these patients to require special attention, as they are frequently unable to communicate their discomfort and thus become more vulnerable to pressure ulcer development. The nurse should be able to diagnose this group of patients early, and to implement actions to reduce complications.

Skin moisture may be related to consciousness level changes and other peripheral nervous system complications. Among these, urinary and fecal incontinence and excessive perspiration are important, requiring serious healthcare team attention. Other factors also contributing to expose patients to moisture are secretions of drainage tubes, sores and food residues.[9] A direct connection was identified for PU and moisture, as prolonged moisture exposure may lead to skin maceration and rupture. Thus, the nursing team should be aware of secretions in the patient's bed, always making sure it is clean and dry.[10]

Regarding the degree of physical activity, the study shows that a large portion of the studied population was bedfast. This is concerning, as patients lying in bed are more prone to PU, and need special attention from the care team regarding decubitus change, skin care, bony prominences protection and special cushions use.[11]

The immobility is one of the most important risk factors for PU, due to the pressure on bony prominences areas, causing tissue destruction.[12] PU prevention is mainly dependent on the nursing team, caring 24 hours daily of the patient. Thus, appropriate decubitus change and bed positioning are indispensable.[13]

A deficient nutrition status is one of the main PU factors as leads to anemia and reduced tissue oxygen, contributing to reduce tissue tolerance to pressure. PU develop faster and is more treatment-resistant in poorly nourished patients. Malnutrition impairs the wounds healing, increases the subject's susceptibility to infection, and contributes to increased complications rate, longer hospitalizations and prolonged bed rest.[10] It is necessary that the nursing team realize their important role on malnourished patients identification, and also other known nutrition-associated aspects identification.[14]

Authors[9] indicate friction and shear as significant PU risk factors. Friction occurs when two surface forces glide against each other, with resulting abrasion and frequently blistering. Shear force is a consequence of inappropriate mobilization or positioning, and causes deeper tissues damage. This is seen when a patient is kept with raised bed head above 30 degrees, allowing the patient to slide down in the bed, injuring specially the sacrum and coccyx regions.[9] The nursing team should early identify and prevent these conditions – and this makes continued education a daily practice ally.

Several studies have demonstrated that PU prevention is as important as risk identification. Thus, the creation of prevention scales and protocols appropriate to each risk level is relevant, as well as promoting its full implementation.

The tools should be simple, easy to use, and in order to be validated be objective-specific, in addition to outcomes anticipation. For PU risk patients' evaluation tools, its is proposed a frequent application in order to provide as early as possible interventions.

The examiners agreement test is used to assess the tool reliability. This reliability may be evaluated by the instrument's accuracy to measure its attribute. The smaller variation it produces on repeated measures, more reliable is the tool. A given tool is reliable when its measure accurately reflects the investigated attributes.

The accurate risk evaluation description, according to the Braden scale 6 subscales, depends on the observer's ability to recognize the patient's PU risks. The different knowledge level between different professionals developing this activity may lead to variable interpretations.

The protocol is based on the PU risk evaluation, using the Braden's scale, and its score define the measures to take (Appendix 4). Thus, a categorization system may look simple and easy for data acquisition, however inappropriate categorization may lead to unnecessary procedures.

In this study, the examiners had high levels of agreement, and showed similar categorizations; so, this protocol can be used to categorize the sores. The lowest coincidence frequency was seen between the examiners 2 and 3 for the items nutrition and moisture, showing requirement of specific training to qualify the nursing team for appropriate protocol implementation.

This simple measurement system was described by several authors as easy to perform, practical and affordable, although inaccurate. According to Santos,[15] some tools require for their application both training and time availability, in addition to the need of at least once a week continued evaluation. The PU categorization scales are deemed subject to biases due to the interpretation subjectivity, as well as the need of previous clinical knowledge, but this is also applicable for any evaluation tool.

The PU prevention protocol implementation has the meaning of a strategic decision to strengthen the care practices. This nurses leaded initiative may mean an institutional endeavor that includes several professional teams. Considering this PU prevention tool effectiveness and feasibility, the relevance of its insertion in the nursing prescription was demonstrated. However, the nurse's technical competence and clinical ability to evaluate the scale's items are indispensable for optimized care.

CONCLUSIONS

The PU risk evaluation with the Braden's scale evidenced that most of these ICU studied patients had high or moderate risk of developing PU. The Braden's scale-based items showed positive responses in the examiners evaluation. The population Kappa null hypothesis was rejected, suggesting that the tool was well interpreted and understood by the examiners in regard of its content, presentation and clearness, allowing the protocol to be safely used for appropriate diagnosis of PU risk patients.

RESUMO

Objetivo: O não desenvolvimento da úlcera de pressão de pacientes graves em terapia intensiva é um grande desafio para a enfermagem. Portanto, é relevante a prevenção para que se garanta um cuidado de boa qualidade. O objetivo da pesquisa foi avaliar a aplicabilidade da escala de Braden em pacientes de terapia intensiva.

Métodos: Estudo prospectivo baseado na avaliação de todos os pacientes internados na unidade de terapia intensiva adulto, no período 14 de Julho a 10 de Agosto de 2009. A coleta de dados foi realizada através da aplicação da escala de Braden por três juízes, identificando os riscos para o desenvolvimento da úlcera de pressão. Para a análise dos dados foi utilizado o *Software* estatístico SAS Na avaliação do grau de coincidência entre os juízes utilizou-se valor *kappa* (IC=95%).

Resultados: Quanto aos fatores de risco relacionados: 36,4% apresentavam leve limitação à percepção sensorial, 50,9% pele ocasionalmente úmida; 97,3% restritos ao leito; 39,1% muito limitados à mobilidade, 45% nutrição provavelmente inadequada, 61,8% apresentaram problema quanto à fricção e cisalhamento. Quanto à concordância entre os juízes (38,1% a 100,0%) foram registradas em nutrição e atividade física; a hipótese do *Kappa* populacional nulo foi rejeitada; análise entre pares de examinadores de coincidência (41,7% a 100,0%) foi registrada no item umidade e atividade física, os valores de *Kappa* variaram de 0,13 a 1.
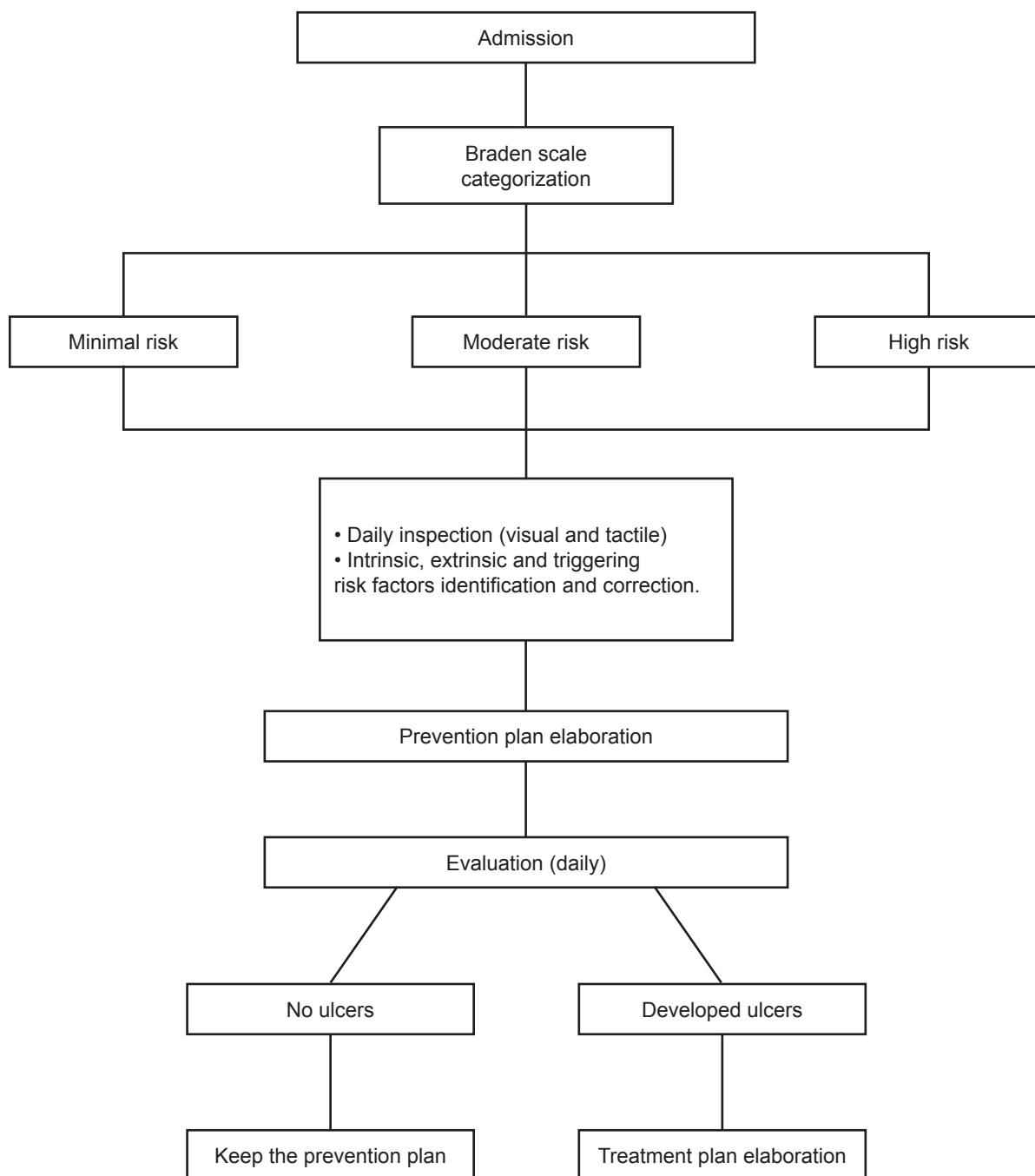
Conclusões: Observou-se elevado risco para ulcera de pressão em pacientes de terapia intensiva. Esse instrumento parece ser adequado para auxiliar na implementação de medidas de prevenção.

Descritores: Estudos de validação; Protocolos; Úlcera de pressão/prevenção & controle; Úlcera de pressão/enfermagem; Terapia intensiva

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Appendix 1 – Care flowchart

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┌─────────────────────────────┐
│         Admission           │
└─────────────────────────────┘

┌─────────────────────────────┐
│       Braden scale          │
│      categorization         │
└─────────────────────────────┘
```

| Minimal risk | Moderate risk | High risk |

```
┌─────────────────────────────────────┐
│ • Daily inspection (visual and       │
│   tactile)                           │
│ • Intrinsic, extrinsic and triggering│
│   risk factors identification and    │
│   correction.                        │
└─────────────────────────────────────┘

┌─────────────────────────────┐
│  Prevention plan elaboration │
└─────────────────────────────┘

┌─────────────────────────────┐
│      Evaluation (daily)      │
└─────────────────────────────┘
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| No ulcers | Developed ulcers |

| Keep the prevention plan | Treatment plan elaboration |

Appendix 2 - Pressure ulcers prevention protocol

Pernambuco State Health Secretary Fundação de Saúde Amaury de Medeiros – FUSAM Hospital da Restauração			
Pressure ulcers prevention protocol			
Patient:		Age:	Medical chart number:
Diagnosis:		Gender: F ( ) M ( )	
HR admission date: Collection date:		ICU admission date: Discharge from ICU:	
Admission ulcer: Yes ( ) No ( )			
Braden Scale			
Sensory Perception	1. Completely limited	2. Very limited	3. Slightly limited	4. No impairment
Moisture	1. Constantly moist	2. Very moist	3. Occasionally moist	4. Rarely moist
Physical activity	1. Bedfast	2. Chairfast	3. Walks occasionally	4. Walks frequently
Mobility	1. Completely immo-bile	2. Very limited	3. Slightly limited	4. No limitation
Nutrition	1. Very ppor	2. Probably inade-quate	3. Adequate	4. Excellent
Friction and Shear	1. Problem	2. Potential problem	3. No apparent problem	Total:

Categorization			
High risk <=12	Moderate risk (13 and 14)	Low risk (15 e 16 if <75 years) (15 e 18 if =>75 years)	No risk (>17)

Admission interventions		
( ) Eggbox cushion ( ) Fenestrated cushion ( ) Transparent film on bony prominences ( ) Clean and dry skin (exudates free)	( ) Bed head kept below 30º ( ) Foam pillows to prevent direct bony surfaces contact (knees); ( ) Pillows under the legs to raise he heels ( ) Dry linens	( )_____ _____ ( )_____ _____ Note:_____ _____ _____

_____
Nurse (professional registration NR)

Appendix 3 – Braden scale

Braden scale				
	1 Point	2 Points	3 Points	4 Points
Sensory perception: Ability to respond meaningfully to pressure-related discomfort	**Completely limited:** unresponsive (does not moan, flinch or grasp) to painful stimuli, due to diminished level of consciousness or sedation OR limited ability to feel pain over most of body.	**Very limited:** responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has sensory impairment which limits the ability to feel pain or discomfort over ½ of body.	**Slightly limited:** responds to verbal commands but cannot always communicate discomfort or the need to be turned OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	**No limitation:** responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.
Moisture: degree to which skin is exposed to moisture	**Constantly moist:** skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	**Very moist:** skin is often, but not always moist. Linen must be changed at least once a shift.	**Occasionally moist:** skin is occasionally moist, requiring an extra linen change, approximately once a day.	**Rarely moist:** skin is usually dry, linen only requires changing at routine intervals.
Physical activity: degree of physical activity	**Bedfast:** confined to bed.	**Chairfast:** ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	**Walks occasionally:** walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.	**Walks frequently:** walks outside room at least twice a day and inside room at least once every two hours during waking hours.
Mobility: ability to change and control body position	**Completely immobile:** does not make even slight changes in body or extremity position without assistance.	**Very limited:** makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	**Slightly limited:** makes frequent though slight changes in body or extremity position independently.	**No limitation:** makes major and frequent changes in position without assistance.
Nutrition: usual food intake pattern	**Very poor:** never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IVs for more than 5 days.	**Probably inadequate:** rarely eats a complete meal and generally eats about ½ of any food offered. Protein intake includes only 3 servings of meat or daily products per day. Occasionally will take a dietary supplement OR receives less than optimum amount of liquid diet or tube feeding.	**Adequate:** 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 usually take a supplement when offered OR is on tube feeding or TPN regimen which probably meets most of nutritional needs.	**Excellent:** eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.
Friction & shear	**Problem:** requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.	**Potential problem:** moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	**No apparent problem:** moves in bed and chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.	
Total points				

The Portuguese version is a translation by Maria Helena Larcher Caliri - EERP – USP, authorized by the author Barbara Braden.[16]

Appendix 4 – Prevention flowchart

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                    ┌──────────────────────┐        ┌──────────────────────┐
                    │   Risk evaluation    │        │  Admitted with ulcer │
                    │   (Braden scale)     │        │                      │
                    └──────────────────────┘        └──────────────────────┘
```

High risk <=12	Moderate risk (13 and 14)	Low risk (15 e 16 if <75 years) (15 e 18 if =>75 years)	No risk (<17)
Fenestrated cushion + eggbox cushion	Fenestrated cushion + eggbox cushion	Eggbox cushion Hygiene	Hygiene Assistance/Supervision
Transparent film on bony prominences	Transparent film on bony prominences	Transparent film on bony prominences	Mobility Assistance/Supervision Hygiene Assistance/Supervision
Hygiene Clean and dry skin Hydration cream Wrinkleless clothing	Hygiene Clean and dry skin Hydration cream Wrinkleless clothing	Hygiene Clean and dry skin Hydration cream Wrinkleless clothing	Nutrition Initial and weekly evaluation
Mobility Position change 2/2h	Mobility Position change 2/2h	Mobility Position change	
Nutrition Initial and weekly evaluation Total or partial support	Nutrition Initial and weekly evaluation Total or partial support	Nutrition Initial and weekly evaluation Total or partial support	