



# Analysis of nursing professionals' knowledge about pressure ulcer prevention: a cross-sectional study

*Análise do conhecimento de profissionais de enfermagem sobre prevenção de lesão por pressão: estudo transversal*

*Análisis del conocimiento de profesionales de enfermería sobre prevención de úlcera por presión: estudio transversal*

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## ABSTRACT

**Objectives:** to analyze and compare the level of knowledge about pressure ulcer prevention among nurses and nursing technicians who work in Intensive Care Units and nursing students in the last year of the course. **Method:** a cross-sectional, descriptive-exploratory study with a quantitative approach, using the Pieper's Pressure Ulcer Knowledge Test. Data were analyzed using the Statistical Package for Social Science, using descriptive and inferential statistics (ANOVA-One Way, Shapiro-Wilk normality test and assumption of homogeneity using Levene's test). **Results:** the research sample included 70 participants, being 22 nurses, 14 nursing technicians and 34 undergraduate nursing students. It was observed that only 22.7% of nurses, 7.1% of technicians and 0.0% of students reached the percentage of correct answers  $\geq 90\%$  recommended by the knowledge test. **Conclusion and implications for practice:** the results found in this study made it possible to identify an insufficient level of knowledge and a mistaken perception of aptitude, related to the pressure ulcer prevention, among the study participants, with emphasis on technicians and undergraduates in nursing. Therefore, this research points to the need for educational actions aimed at training the aforementioned public.

**Keywords:** Knowledge; Nurses; Nursing; Pressure ulcer; Prevention.

## RESUMO

**Objetivos:** analisar e comparar o nível de conhecimento sobre prevenção de lesão por pressão entre enfermeiros e técnicos de enfermagem que atuam em Unidades de Terapia Intensiva e graduandos em enfermagem no último ano do curso. **Método:** estudo transversal, de caráter descritivo-exploratório e de abordagem quantitativa, utilizando o *Pieper's Pressure Ulcer Knowledge Test*. Os dados foram analisados através do *Statistical Package for Social Science*, mediante estatística descritiva e inferencial (ANOVA-One Way, teste de normalidade de Shapiro-Wilk e pressuposto de homogeneidade através do teste de Levene). **Resultados:** a amostra da pesquisa abarcou 70 participantes, sendo 22 enfermeiros, 14 técnicos de enfermagem e 34 graduandos em enfermagem. Foi visto que apenas 22,7% dos enfermeiros, 7,1% dos técnicos e 0,0% dos graduandos em enfermagem atingiram o percentual de acertos  $\geq 90\%$  recomendado pelo teste de conhecimento. **Conclusão e implicações para a prática:** os resultados encontrados neste estudo permitiram identificar um nível insuficiente de conhecimento e uma percepção de aptidão equivocada, relacionados à prevenção de lesão por pressão, entre os participantes do estudo, com ênfase para os técnicos e para os graduandos em enfermagem. Logo, esta pesquisa aponta para a necessidade de ações educativas que visem a capacitação do público supramencionado.

**Palavras-chave:** Conhecimento; Enfermagem; Enfermeiros; Lesão por pressão; Prevenção.

## RESUMEN

**Objetivos:** analizar y comparar el nivel de conocimiento sobre prevención de úlceras por presión entre enfermeros y técnicos de enfermería que actúan en Unidades de Cuidados Intensivos y estudiantes de enfermería en el último año del curso. **Método:** estudio transversal, descriptivo-exploratorio y de abordaje cuantitativo, utilizando el *Pieper's Pressure Ulcer Knowledge Test*. Los datos fueron analizados mediante el *Statistical Package for Social Science*, utilizando estadística descriptiva e inferencial (ANOVA-One Way, prueba de normalidad de Shapiro-Wilk y suposición de homogeneidad mediante la prueba de Levene). **Resultados:** la muestra contó con 70 participantes, siendo 22 enfermeros, 14 técnicos de enfermería y 34 estudiantes de graduación en enfermería. Se observó que sólo el 22,7% de los enfermeros, el 7,1% de los técnicos y el 0,0% de los estudiantes alcanzaron el porcentaje de aciertos  $\geq 90\%$  recomendado por la prueba de conocimiento. **Conclusión e implicaciones para la práctica:** los resultados encontrados permitieron identificar un nivel de conocimiento insuficiente y una percepción de aptitud errónea, relacionada con la prevención de úlceras por presión, entre los participantes del estudio, con énfasis en los técnicos y estudiantes de enfermería. Por lo tanto, esta investigación apunta la necesidad de acciones educativas dirigidas a la formación de dicho público.

**Palabras clave:** Conocimiento; Enfermería; Enfermero; Úlcera por presión; Prevención.

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## INTRODUCTION

The development of Pressure Ulcer (PU)/ Pressure Injury (PI) is one of the most important and recurrent complications of the hospitalization process, being responsible for the worsening of the health conditions of the affected individuals and for the consequent extension of their hospitalization period.<sup>1</sup>

According to the National Pressure Injury Advisory Panel (NPIAP), PU represents localized damage to the skin and/or underlying soft tissues, usually located over a bony prominence, or related to the use of a medical device or other artifacts, occurring as a result of intense and/or prolonged pressure or its association with shear. Furthermore, it is known that factors such as microclimate, nutrition, perfusion, comorbid conditions, and the conditions of the own soft tissues may be related to the development of a PU.<sup>2,3</sup>

The classification of this condition is based on stages and indicates the extent of tissue damage, in which stage 1 presents non-blanchable erythema on intact skin; stage 2 corresponds to loss of partial thickness of the skin with exposure of the dermis; stage 3 equals full-thickness skin loss; stage 4 consists of full-thickness skin loss and tissue loss; unclassifiable represents non-visible tissue loss; and deep tissue pressure ulcer, in turn, is when a dark red, brown or purple discoloration is observed, which is persistent and does not whiten.<sup>3,4</sup>

Although avoidable in most cases, these injuries still represent a great misfortune for the individual and for society, affecting about 3 million adults only in the United States<sup>5</sup> and incurring in high costs for the Health System. Globally, it is estimated that the annual outlay with the treatment of this damage and its complications revolved around 11 billion dollars,<sup>1</sup> being considered the third most expensive health condition, after cancer and cardiovascular diseases.<sup>6</sup>

Furthermore, it appears that its occurrence is considered an interdisciplinary challenge and a negative indicator of the quality of health and nursing care,<sup>7</sup> with its prevention now considered the sixth target among the International Goals for Patient Safety, combined with the reduction the risk of falls.<sup>8</sup>

In this context, the intensive care environment stands out as the unit with the highest incidence of PU in the hospital environment<sup>1</sup>. In numbers, it is estimated that approximately 3.3% to 39.3% of inmates in this sector are treated for this injury, due to different characteristics, such as multiple associated comorbidities, unstable hemodynamics, the fact that they are bedridden and in greater use of medical devices and special medications.<sup>9</sup>

Nursing, in turn, is inserted in this context as a profession responsible for assisting patients 24 hours a day, basing its performance on a systematic and deliberative process, divided into 5 stages, in which the needs of the client must be investigated, evaluated and, thus, satisfactorily assisted, both for ethical and legal reasons.<sup>10</sup>

However, limited knowledge sometimes interferes with the clinical practice of those professionals, resulting in actions based on intuition, experience or habit. These actions, however, significantly lead to the occurrence and/or worsening of the PU.<sup>11</sup>

With a view to modifying this scenario, it is pointed out the indispensability of professional qualification even during the undergraduate course.<sup>12</sup> However, national and international research verifies that the students' training period can be marked by gaps that culminate in an important deficit of knowledge about PU. This panorama, however, may end up reflecting negatively on the care practice of these future professionals.<sup>13,14</sup>

A multicenter study, carried out with 474 nurses and nursing assistants, showed a significant lack of knowledge of these workers about the prevention of PU.<sup>15</sup> Similarly, a systematic review that sought to assess nursing's general knowledge about PU prevention concluded that most nurses still do not have a sufficient level of knowledge about this topic.<sup>16</sup>

Furthermore, it was found that this same indicator was even lower when analyzed in undergraduate nursing students and nursing technicians,<sup>16</sup> thus pointing to the need for a more in-depth assessment of the knowledge of this public and, consequently, for carrying out training aimed at knowledge gaps.

In view of the above, the study is based on the following guiding question: how is the knowledge related to the prevention of PU found among nurses and nursing technicians who work in intensive care environments and among undergraduates in the last year of the nursing course?

Thus, to answer the proposed question, the following objective was outlined: to analyze and compare the knowledge of nurses and nursing technicians who work in the ICU and of nursing students in the last year of the undergraduate course, on the prevention of PU.

## METHOD

This is a cross-sectional study, with a descriptive-exploratory character and a quantitative approach, carried out in a virtual environment due to the pandemic caused by the New Coronavirus (Sars-CoV-2), following all the guidelines of Circular Letter No. 2/2021, of the National Ethics Commission of the Executive Secretariat of the National Health Council and of the Ministry of Health.

The research sample consisted of 70 participants, divided into nurses, nursing technicians and nursing students. For this purpose, the technique of non-probabilistic convenience sampling was used. It is noteworthy that this type of sampling is used when there is no access to the entirety of the individuals that make up the population, taking into account only the accessible portion.<sup>17</sup>

The research was propagated on social media, from August to September 2021, according to a pre-established schedule by the authors, which justifies the quantitative sample of this study.

The disclosure took place in the form of an invitation, containing the access link to the study form. There was no restriction of participants regarding the educational institution or hospital service where they were allocated. By accessing the link, the volunteers had access to sections containing information about the research, the Free and Informed Consent Form and the data collection questionnaires.

As inclusion criteria, the following were used: 1) for nurses: being Brazilian, having a degree in nursing and working in the care of bedridden patients in the ICU; 2) for nursing technicians: being Brazilian, aged 18 years or older and providing assistance to bedridden patients in the ICU; 3) for undergraduate students: being Brazilian, aged 18 years or older and duly enrolled in the last year of the nursing course during the research period. Among the professionals, those who had worked in the ICU for less than six months were excluded; for nursing students, those who, for whatever reason, did not attend the curricular component equivalent to the ICU.

Thus, two previously structured questionnaires were applied via Google Forms for each group, which were divided into sections, namely: a questionnaire aimed at characterizing the participants and another with questions aimed at assessing their knowledge about PU. The characterization instrument was composed of the variables: professional training; sex; age; marital status; highest degree; period you are attending; monthly income; practice time in the intensive care area; if you consider yourself able to act in the prevention of PU; if you have already received some type of training/course on PU prevention; type of office where you work/study; whether a scale is used to assess PU risk.

With regard to the instrument for assessing the sample's knowledge about PU prevention, available in Chart 1, the Pieper's Pressure Ulcer Knowledge Test – PUKT, was used, already validated and adapted in Brazil. This tool has a knowledge test with 41 statements divided into the categories of knowledge about PU assessment and classification (8 items) and knowledge about PU prevention (33 items). Participants must mark the topics considering the options true (T), false (F) and Don't Know (DK). For each correct answer, one point must be added, and the total score is composed of the sum of all correct answers, in the form of a percentage. At the end, a percentage of correct answers  $\geq 90\%$  is considered satisfactory.<sup>18</sup>

With a view to minimizing biases in data collection, the form was configured to identify the participants' e-mails, always limited to a single answer and so that they could not edit the document after sending it.

The data obtained were tabulated in the Microsoft Office Excel® program and transferred for analysis in SPSS, version 26.0. Thus, an ANOVA-One-Way analysis (one-way variance) was carried out with the objective of assessing whether there are differences in the levels of correct answers between the professional categories of nursing (nurses, nursing technicians and nursing students). In addition, the Shapiro-Wilk Normality Test and the assumption of homogeneity were performed using the Levene's Test.

In order to guarantee greater confidence between the results, were performed bootstrapping procedures (1000 re-samplings; 95% CI BCa) and normality corrections between the groups, aiming to present a 95% confidence interval for the differences between the means.<sup>19</sup> To ensure variance heterogeneity, Welch correction was also performed, followed by post-hoc evaluation.<sup>20</sup>

It is noteworthy that the execution of the research took place after a favorable opinion of the Research Ethics Committee, under number 4,925,819, following the precepts of resolution 466/12, of the National Health Council.

## RESULTS

Of the 70 interviewees, it was found that 34 (48.5%) were nursing students, most of whom were female (32; 94.1%), aged between 18 and 25 years (31; 91.2%), single (30; 88.2%), studying the tenth period (19; 55.9%), with a monthly income between one and two minimum wages (26; 76.5%) and linked to a private educational institution (23; 67.6%).

With regard to nursing technicians (14; 20%), there was a predominance of females (13; 92.9%), aged between 34 and 41 years (5; 35.7%), married (8; 57.1%), with technical instruction (14; 100.0%), earning between one and two minimum wages (13; 92.1%), working in a public health institution (14; 100.0%) and with experience of more than five years in intensive care (10; 71.4%).

Among the 22 (31.4%) nurses, the prevalence was also of females (20; 90.9%), between 26 and 33 years old (8; 36.4%), married (13; 59.1%), with specialization (15; 68.2%), income between one and two minimum wages (9; 40.9%), with employment in public department (19; 86.4%) and practice time between six months and one year in intensive care (9; 40.9%).

Table 1 displays the results of the distribution of the percentages of correct answers in the PUKT. Thus, it was observed that undergraduates (15; 44.1%) and nurses (11; 50.0%) presented, in most cases, a percentage of correct answers between 80 and 89%, and technicians (5; 35.7%), between 70 and 79%.

Table 2 shows the association between the PUKT and the work characteristics of nurses and nursing technicians, revealing that the unsatisfactory knowledge analyzed by the PUKT was greater among professionals who had worked in intensive care for between four and five years (2; 100.0%); who had not received training or a course on PU prevention (16; 94.1%); who did not consider themselves able to act to prevent this damage (11; 100%); and who used the Norton scale to assess the risk of pressure ulcers (1; 100.0%). It is noteworthy that no statistical significance was observed. However, it is considered that this fact may be linked to the small sample size of the study, not revealing, therefore, that the effect found is very low or null.

It should also be noted that the participants were also asked about the use of the CALCULATE scale. However, as no affirmative answers were obtained about its use, it was decided not to insert it in the table.

The Levene's Test showed that the groups did not show homogeneity of variance between the total score (Levene (2, 67) = 1.002,  $p = 0.37$ ), as well as the knowledge score on PU prevention (Levene (2, 67) = 0.183,  $p = 0.83$ ) and in the evaluation category (Levene (2, 67) = 1.519,  $p = 0.22$ ). The descriptive results of the differences between the groups imply that the nurses' average score was higher than that of undergraduate nursing students

**Chart 1.** Pieper’s Pressure Ulcer Knowledge Test (PUKT).

Nº	QUESTION	ANSWER		
		T	F	DK
1	Stage I Pressure Ulcer is defined as intact, with hyperemia of a localized area, which has no visible whitening or differs in color from the surrounding area.	X		
2	The risk factors for the development of Pressure Ulcer are: immobility, incontinence, inadequate nutrition and alteration of the level of consciousness.	X		
3	All patients at risk for Pressure Ulcer should have systematic skin inspection at least weekly.		X	
4	Using hot water and soap can dry out the skin and increase the risk of Pressure Ulcer.	X		
5	It is important to massage the regions of bony prominences if they are hyperemic.		X	
6	A stage III Pressure Ulcer is a partial loss of skin, involving the epidermis.		X	
7	All patients should be assessed on admission to the hospital for risk of developing a Pressure Ulcer.	X		
8	Creams, clear dressings and extra-fine hydrocolloid dressings help protect the skin against the effects of friction.	X		
9	Pressure Ulcers, in stage IV, present total loss of skin with intense destruction and tissue necrosis or damage to muscles, bones or supporting structures.	X		
10	An adequate dietary intake of protein and calories should be maintained during illness/hospitalization.	X		
11	Patients who are confined to bed should be repositioned every 3 hours.		X	
12	A scale with times for changing positions should be used for each patient with or at risk of Pressure Ulcer.	X		
13	Water or air gloves relieve heel injuries.		X	
14	Donut shaped water or air cushions help prevent Pressure Ulcer.		X	
15	In the lateral decubitus position, the patient with the presence of Pressure Ulcer or at risk for the same must remain at an angle of 30 degrees in relation to the bed mattress.	X		
16	In patients with Pressure Ulcer or at risk for it, the head of the bed should not be raised at an angle greater than 30 degrees, if there is no medical contraindication.	X		
17	Patients who cannot move on their own should be repositioned every 2 hours when sitting in the chair.		X	
18	The patient with limited mobility and who can change body position without assistance should be instructed to relieve pressure every 15 minutes while sitting in the chair.	X		
19	The patient with limited mobility and who can remain in the chair must have a cushion on the seat to protect the bony prominences region.	X		
20	Stage II Pressure Ulcers show full-thickness skin loss.		X	
21	The patient’s skin at risk for Pressure Ulcer must remain clean and free of moisture.	X		
22	Measures to prevent new injuries do not need to be adopted continuously when the patient already has a Pressure Ulcer.		X	
23	Movable sheets or bed linen should be used to transfer or move patients who cannot move on their own.	X		
24	Mobilization and transfer of patients who cannot move on their own should always be performed by two or more people.	X		
25	In the patient with a chronic condition who cannot move independently, rehabilitation should be initiated and include guidance on Pressure Ulcer prevention and treatment.	X		
26	Every patient who cannot walk should be submitted to risk assessment for the development of Pressure Ulcer.	X		
27	Patients and family members should be advised about the causes and risk factors for the development of Pressure Ulcer.	X		
28	The regions of bony prominences can be in direct contact with each other.		X	
29	Every patient at risk for developing Pressure Ulcer should have a mattress that redistributes pressure.	X		
30	The skin, when macerated by moisture, is more easily damaged.	X		
31	Pressure Ulcers are sterile wounds.		X	

Source: Elaborated by the authors

Chart 1. Continued...

Nº	QUESTION	ANSWER		
		T	F	DK
32	A region of skin scarred by Pressure Ulcer may be injured more quickly than intact skin.	X		
33	A blister in the heel region should not be a cause for concern.		X	
34	A good way to decrease pressure in the heel region is to keep the heels elevated from the bed.	X		
35	All precautions to prevent or treat Pressure Ulcers do not need to be registered.		X	
36	Shear is the force that occurs when skin adheres to a surface and the body slides.	X		
37	Friction may occur when moving the patient on the bed.	X		
38	Stage 2 Pressure Ulcers can be extremely painful due to the exposure of nerve endings.	X		
39	In the patient with incontinence, the skin must be cleaned at the time of eliminations and at routine intervals.	X		
40	The development of educational programs in the institution can reduce the incidence of pressure ulcers.	X		
41	Hospitalized patients need to be assessed for risk of Pressure Ulcer only once during their stay		X	

Source: Elaborated by the authors

Table 1. Distribution of the percentages of correct answers in the PUKT among the study participants. Campina Grande, Paraíba, Brazil, 2021.

Percentage of correct answers	Nursing undergraduates (N=34)	Nursing technicians (N=14)	Nurses (N=22)
	n (%)	n (%)	n (%)
50 - 59%	1 (2.9)	0 (0.0)	0 (0.0)
60 - 69%	7 (20.6)	4 (28.6)	0 (0.0)
70 - 79%	11 (32.4)	5 (35.7)	6 (27.3)
80 - 89%	15 (44.1)	4 (28.6)	11 (50.0)
≥ 90%	0 (0.0)	1 (7.1)	5 (22.7)

Table 2. Association between the PUKT and the job characteristics of nurses and nursing technicians. Campina Grande, Paraíba, Brazil, 2021.

Variables	PUKT		p-value
	Unsatisfactory n (%)	Satisfactory n (%)	
<b>Practice time in the intensive care area</b>			
6 months - 1 year	12 (92.3)	1 (7.7)	0.527*
2 - 3 years	2 (66.7)	1 (33.3)	
4 - 5 years	2 (100.0)	0 (0.0)	
> 5 years	14 (77.8)	4 (22.2)	
<b>Have you received any type of training/course on PU prevention?</b>			
Yes	14 (73.7)	5 (26.3)	0.182*
No	16 (94.1)	1 (5.9)	
<b>Do you consider yourself able to act in the prevention of PU?</b>			
Yes	19 (76.0)	6 (24.0)	0.09*
No	11 (100.0)	0 (0.0)	
<b>Do you use any scale to assess the risk of developing PU?</b>			
Yes, I use the Braden scale	19 (82.6)	4 (17.4)	0.358*
Yes, I use the Norton scale	1 (100.0)	0 (0.0)	
Yes, I use the Waterlow scale	0 (0.0)	1 (100.0)	
No, I don't use any scale	10 (90.9)	1 (9.1)	

Note: \*Fisher's Exact Test.

and that of nursing technicians between the prevention and evaluation facets, as shown in Table 3.

The post-hoc test, interpreted through bootstrapping procedures, showed that when considering the total knowledge score, significant differences were found between the mean scores of nurses and nursing students (CI=1.30 - 4.33;  $p = 0.00$ ) and between nurses and nursing technicians (CI=0.82 - 4.60;  $p = 0.04$ ), allowing us to understand that there were more correct answers in the complete instrument by nurses when compared to nursing technicians and to undergraduate nursing students, being the result shown in Table 4.

Regarding the average of the category of knowledge about PU prevention, there were differences between the group of nurses and nursing students (CI=1.14 - 3.86;  $p=0.00$ ), indicating that the average of correct answers among nurses was significantly higher than among nursing students regarding PU prevention issues. Among the PU evaluation category, there were no differences between groups ( $p = 0.090$ ), as shown in Table 4.

**DISCUSSION**

The results of the present study indicated a prevalence of female participants in the three analyzed groups, reinforcing the historical conception that the health sector, especially in the field of nursing, is mostly composed of women.<sup>21</sup> Despite this, there is a gradual increase in the number of male individuals in

this profession, given the nullification of the idea of caring as an exclusive female characteristic.<sup>22</sup>

From another perspective, it was seen that most of those who already work professionally were married and aged between 26 and 41 years, representing, in this age group, about 74.9% of nursing professionals in activity in Brazil.<sup>21</sup> On the other hand, it was found that most nursing students in their last year were single, aged between 18 and 25 years, thus corresponding to the characteristic profile of young students who opt for stability and financial independence before settling in a relationship.<sup>22</sup>

With regard to the participants' knowledge about PU prevention, it was seen that the majority of respondents did not obtain the 90% percentage of correct answers recommended by the PUKT. Although, prior to carrying out of this, it has been shown an ensured feeling of aptitude to act in the prevention of this damage.

These data draw attention to the false idea of aptitude and its possible practical implications. In addition, they corroborate with the national and international literature as they show the significant deficit of knowledge that exists among this public on the analyzed subject.<sup>6,10,13,14</sup>

In general, it was seen that the highest percentage of errors in questions related to the evaluation and classification of PU was concentrated in items number 6, 20, 31 and 38. In these, the percentile of inaccuracies ranged from 30 to 47.1%. With regard to questions that assess knowledge related to PU prevention,

**Table 3.** Descriptive statistics by the bootstrapping estimate between the means and standard deviation of the total PUKT score and the prevention and evaluation categories. Campina Grande, Paraiba, Brazil, 2021.

Comparison between groups		Descriptive Statistics	Total score			
			Standard Error	Lower Limit	Upper Limit	p-value
Nurse	Average (SD)	34,05 (2,53)	0.55 (0.32)	32.96 (2.01)	35.05 (2.90)	0.00
Nurse Technician	Average (SD)	31,36 (3,31)	0.86 (0.55)	29.61 (2.47)	33.00 (3.83)	
Undergraduate Student	Average (SD)	34,05 (2,53)	0.61 (0.41)	29.96 (2.7)	32.48 (4.14)	
Total	Average (SD)	32,16 (3,43)	0.41 (0.30)	31.31 (2.91)	32.93 (3.87)	
<b>Prevention score</b>						
Nurse	Average (SD)	27.64 (2.27)	0.47 (0.26)	26.75 (1.88)	28.50 (2.54)	0.00
Nurse Technician	Average (SD)	25.64 (3.05)	0.82 (0.67)	24.00 (1.88)	27.42 (3.86)	
Undergraduate Student	Average (SD)	25.18 (3.13)	0.52 (0.57)	24.09 (2.03)	26.10 (3.98)	
Total	Average (SD)	26.04 (3.04)	0.36 (0.36)	25.29 (2.40)	26.73 (3.64)	
<b>Evaluation score</b>						
Nurse	Average (SD)	5.77 (1.11)	0.23 (0.12)	5.32 (0.89)	6.25 (1.25)	0.17
Nurse Technician	Average (SD)	5.00 (0.96)	0.26 (0.16)	4.58 (0.68)	5.44 (1.10)	
Undergraduate Student	Average (SD)	5.59 (1.37)	0.24 (0.17)	5.09 (1.01)	6.05 (1.61)	
Total	Average (SD)	5.53 (1.23)	0.15 (0.09)	5.24 (1.06)	5.80 (1.38)	

**Table 4.** Bootstrapping estimate (95% CI BCa) between the mean PUKT total score and prevention and evaluation categories. Campina Grande, Paraíba, Brazil, 2021.

Comparisons between groups		Difference of Means	Total score			p-value
			Standard Error	Lower Limit	Upper Limit	
Nurse	Undergraduate Student	2.78	0.80	1.30	4.33	0.00
	Nurse Technician	2.68	1.01	0.82	4.60	0.04
Nurse Technician	Undergraduate Student	0.09	1.07	-2.12	2.10	0.99
<b>Prevention score</b>						
Nurse	Undergraduate Student	2.46	0.69	1.14	3.86	0.00
	Nurse Technician	1.99	0.95	-0.03	3.85	0.11
Nurse Technician	Undergraduate Student	0.46	0.94	-1.30	2.38	0.88
<b>Evaluation score</b>						
Nurse	Undergraduate Student	0.18	0.33	-0.83	0.44	0.84
	Nurse Technician	0.77	0.34	0.03	1.52	0.08
Nurse Technician	Undergraduate Student	0.58	0.35	-0.12	1.28	0.22

most of the mistakes were revealed in items 3, 5, 11, 13, 14, 15, 16, 17 and 18. In these, the error rate ranged from 44.2 to 77.1%.

A descriptive study, carried out with 390 nurses who worked in ICUs in Turkey, revealed that of this number, only 23 nurses (5.9%) demonstrated a satisfactory level of knowledge regarding the prevention of PU.<sup>10</sup>

Another study, this time carried out with 89 intensive care nurses from Iran, pointed to inadequate knowledge of professionals about PU prevention, with a percentage of correct answers varying between 20.7% and 76.1%. The authors showed that these results could be attributed to the formal education received by nurses during the undergraduate course and to the lack of training opportunities and updates in the work environment.<sup>6</sup>

Following the same line of results, a Brazilian study carried out in an ICU in Manaus, using the same test used in the present research, revealed insufficient knowledge on the part of nurses and nursing technicians/assistants. In it, it was seen that the first group had an overall mean of correct answers lower than the second, being 51.4% and 63.4%, respectively.<sup>23</sup>

In contrast, the present study detected a higher percentage of correct answers for nurses when compared to nursing technicians, even though most technicians had worked in intensive care for more than five years, while nurses between six months and one year.

It is believed, therefore, that the situation found is due to the longer study time devoted by nurses, since most of them had at least one specialization. Thus confirming the premise that the higher the level of education, the higher the level of knowledge.<sup>24</sup>

Furthermore, these data reveal that although the time of performance provides greater experience, this does not necessarily reflect an improvement in the quality of care, since the care process requires constant updating and recycling.<sup>25</sup>

This fact corroborates the data of this research, revealing that the unsatisfactory knowledge analyzed by the PUKT was greater among professionals who had been practicing intensive care for between four and five years, and who had not received training or a course on PU prevention.

A higher percentage of errors was also identified in those who did not feel able to act in the prevention of PU, used the Norton scale to assess the risk of this injury, followed by those who did not use any scale in the exercise of their functions. Thus indicating a possible weakness in the training process that, inevitably, may end up reflecting on care practice.<sup>11</sup>

It is known that the use of adequate scales effectively helps in the detection of risks for the development of PU, constituting one of the main tools to act in the prevention and control of this condition,<sup>26</sup> since it allows nursing professionals to plan care focused on individual needs of each patient, helping diagnosis, treatment and prevention processes.<sup>27</sup> Therefore, knowledge about these assistances and their respective use should be considered priorities in training and continuing education programs.<sup>28</sup>

The Braden scale is inserted in this context as a facilitating resource in the prevention process, given that it constitutes a validated and easy-to-use instrument for assessing the risk of developing PU.<sup>29</sup> In addition, it stands out as one of the main instruments used in intensive care settings,<sup>30</sup> although currently the CALCULATE scale has been demonstrating better performance with regard to predicting the risk of PU.<sup>31</sup>

From this perspective, the relevance of educational actions that promote knowledge and, consequently, changes in attitudes on the part of nursing with regard to PU prevention is highlighted.

A longitudinal study, carried out with 12 intensive care nurses, verified an increase in the participants' knowledge about PU after

an educational intervention, solidifying the understanding that training and qualification constitute one of the safest ways to enrich a company's employees and generate productivity and/or increase of the quality of care.<sup>32</sup>

With regard to undergraduate nursing students, an unsatisfactory performance was observed for most of this group in relation to the PUKT and when compared to nurses. Similarly, a Brazilian research carried out with 23 nursing students from the last period, also using the PUKT, identified that most of the participants correctly answered between 70% and 80% of the questions related to the evaluation and classification of PU. However, with regard to prevention, it was seen that in some topics the percentage of error varied between 82.6% and 87%.<sup>13</sup>

These data indicate concern when considering that future nurses will be responsible for training and guiding nursing technicians and assistants regarding the care provided to patients.<sup>23</sup>

Equally, a cross-sectional study carried out with 259 undergraduate nursing students identified that those involved achieved low correct scores, between 32.3% and 33.5%, justified by the lack of subjects that favor the theme of PU during the students' training period. These findings, in turn, reinforce the indispensability of further studies with this population and the adoption of educational measures that reverse this situation.<sup>14</sup>

In the meantime, a quasi-experimental before-and-after study, carried out with undergraduate nursing students, noted that, after an educational intervention, the target group obtained a significantly higher mean score for knowledge about PU prevention than the control group,<sup>33</sup> justifying, thus, the relevance of this type of action.

It also highlights the importance of rethinking the curriculum, providing greater discussion and approach on the subject of pressure ulcers in different disciplines, since most of this student public has the academy as the main source of information on this topic. Furthermore, the literature emphasizes the importance of extracurricular activities by students, namely: extension courses, research and academic leagues.<sup>12</sup>

A guideline developed by the European Pressure Ulcer Advisory Panel (EPUAP), NPIAP and Pan Pacific Pressure Injury Alliance (PPPIA) about the prevention and treatment of PU brings as a strong scientific recommendation the implementation of multifaceted education programs as an efficient resource for the prevention of this damage. The document also reinforces that these actions must include professionals, caregivers, patients and/or people at risk of developing PU.<sup>3</sup>

In this sense, the indispensability of an up-to-date and qualified nursing staff to act in the prevention of PU is reinforced, since the incidence of this condition in hospitals and the level of knowledge of professionals are intrinsically related.<sup>25</sup>

Regarding the present study, the main limitation is the restricted sample size, resulting from the short period of data collection and the resistance of the target public to participate in the research. However, it is observed that the results of this construct are presented to the scientific literature at an opportune time for public health, revealing the need for educational actions to guarantee quality health care.

## CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

The results found in this study made it possible to identify an insufficient level of knowledge and a mistaken perception of aptitude, related to the prevention of pressure ulcers (PU), among the study participants. It was identified that only 22.7% of nurses, 7.1% of technicians and 0.0% of undergraduate nursing students reached the percentage of correct answers  $\geq$  90%, recommended by the PUKT test. Thus, the importance of studies focusing on educational actions aimed at training this public becomes noteworthy.

In addition, it is recommended the effective inclusion of subjects that favor the theme addressed in this study in the curricular matrix of higher education and technical training courses, so that future professionals can guarantee the execution of an increasingly safe and risk-free assistance to the patient, who in turn needs actions aimed at preventing PU.

## AUTHOR'S CONTRIBUTIONS

Study design. Igor de Sousa Nóbrega.

Data collection. Igor de Sousa Nóbrega.

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