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KNOWLEDGE OF NURSING STUDENTS ABOUT PRESSURE INJURIES: CHALLENGE FOR PATIENT SAFETY

CONHECIMENTO DE ACADÊMICOS DE ENFERMAGEM SOBRE LESÕES POR PRESSÃO: DESAFIO PARA A SEGURANÇA DO PACIENTE

CONOCIMIENTO DE LOS ESTUDIANTES DE ENFERMERÍA ACERCA DE LAS LESIONES CAUSADAS POR PRESIÓN: DESAFÍO PARA LA SEGURIDAD DEL PACIENTE

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Objective: to describe the knowledge of nursing students in relation to evaluation, classification and prevention of pressure injuries. Method: cross-sectional and quantitative research, performed at a higher education institution in the state of Paraná. The questionnaire Pieper Knowledge Test was applied in May 2019 to 158 students enrolled in the second, third and fourth years of the graduate course. Data were analyzed through descriptive and analytical statistics; questions with ≥90% of right answers represented satisfactory knowledge. Results: the knowledge about pressure injuries was considered unsatisfactory in 56.1% of the questions. The mean scores of students from the fourth year was significantly higher than the average of the second year for items concerning preventive measures (p=0.006). In other comparisons, there were no significant differences. Conclusion: the knowledge of the nursing students with respect to the evaluation, classification and prevention of pressure injuries was unsatisfactory in all years.

Descriptors: Pressure Ulcer. Students, Nursing. Knowledge. Prevention.

Objetivo: descrever o conhecimento dos acadêmicos de enfermagem em relação à avaliação, classificação e prevenção de lesões por pressão. Método: pesquisa transversal e quantitativa, realizada em instituição de ensino superior particular do estado do Paraná. Foi aplicado o questionário, Teste de Conhecimento de Pieper, no mês de maio de 2019, para 158 acadêmicos matriculados nos 2º, 3º e 4º anos do curso de graduação. Os dados foram analisados por estatística descritiva e analítica; questões com acertos ≥90% representaram conhecimento satisfatório.

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Resultados: o conhecimento sobre lesões por pressão foi considerado insatisfatório em 56,1% das questões. A média de acertos dos acadêmicos do 4º ano foi significativamente superior à média do 2º ano, para os itens relativos às medidas preventivas (p=0,006). Nas demais comparações não houve diferenças significativas. Conclusão: o conhecimento dos acadêmicos de enfermagem com relação à avaliação, classificação e prevenção de lesões por pressão foi insatisfatório em todos os anos.

Descritores: Lesão por Pressão. Estudantes de Enfermagem. Conhecimento. Prevenção.

Objetivo: describir el conocimiento de los estudiantes de enfermería en relación con la evaluación, clasificación y prevención de las lesiones causadas por presión. Método: estudio transversal y cuantitativo, realizado en una institución de educación superior en el estado de Paraná. El cuestionario Test de Conocimientos de Pieper fue aplicado, en el mes de mayo de 2019, a 158 estudiantes matriculados en el 2º, 3º y 4º años del curso universitario. Los datos fueron analizados mediante estadística descriptiva y analítica; cuestiones con éxitos ≥90% representaron un conocimiento satisfactorio. Resultados: el conocimiento acerca de las lesiones causadas por presión fue considerado insatisfactorio en el 56,1% de las cuestiones. Las puntuaciones medias de los alumnos del 4º año fue significativamente mayor que el promedio del segundo año para artículos sobre medidas preventivas (p=0,006). En otras comparaciones, no hubo diferencias significativas. Conclusión: el conocimiento de los estudiantes de enfermería con respecto a la evaluación, clasificación y prevención de lesiones causadas por la presión fue insatisfactorio en todos los años.

Descriptores: Úlcera por Presión. Estudiantes de Enfermería. Conocimiento. Prevención.

Introduction

The prevention, treatment and rehabilitation of individuals with skin lesions are responsibilities of health professionals, especially nurses[1]. However, these actions are still challenges for health services, mainly in relation to pressure injuries (PI), due to its multifactorial etiology and the dynamism of the predisposing (intrinsic and extrinsic) factors that contribute to the development of this type of lesion[2-3].

The National Pressure Injury Advisory Panel (NPIAP) defines PI as any damage located in the skin and/or underlying tissues, usually on the bone protuberance, resulting from intense and/or prolonged pressure or pressure combined with shear[4-5]. They are classified in stage I (intact skin with erythema that does not whiten), stage II (partial loss of skin thickness with its exposure), stage III (total loss of skin thickness), stage IV (total loss of skin thickness and tissue loss), and non-classifiable (deep tissue injury, injury related to the use of medical devices and lesions in the mucous membrane)[4-5].

The PI and its prevention are considered important quality indicators and are classified as avoidable adverse events (AE)[2]. These affect the life of the person who develops it, of their families and of the institution[4], with increased time of hospitalization, mortality and hospital costs[6]. Despite the ongoing efforts of health professionals, especially nurses, regarding the development of PI-preventive actions, there is a high prevalence and incidence of AE in the hospital environment. In a multicenter study, conducted in 25 hospitals in China, the prevalence rate was 3.38%; 84.03% were classified into stages I and II. The sacral and heel regions were the most affected (48.22%)[7].

Concerning Brazil, according to the National Report of Healthcare-Related Incidents, in the period from March 2014 to May 2019, of the 325,430 reported cases, 59,417 (18.3%) corresponded to PI notifications, being, during this period, the third type of event most notified by health institutions in the country. The report highlighted the occurrence of approximately 8,245 never events (events that should never occur in health services), with 5,946 (72.1%) resulting from PI, stage III, and 1,807 (21.9%) resulting from PI, stage IV. In relation to deaths reported in this period, around 49 (3%) were caused by this AE[8].

Therefore, PI persist as a relevant and current problem, in the context of patient safety, in national and international health organizations.

In this way, guidelines related to the evaluation, diagnosis, prevention and treatment of PI are recommended by international bodies, such as the National Pressure Injury Advisory Panel (NPIAP), the European Pressure Injury Advisory Panel (EPIAP), Pan Pacific Pressure Injury Alliance (PPPIA) and the National Institute for Health and Care Excellence (NICE), aiming to direct the clinical practice[9-10].

The implementation of actions to reduce the cases of PI is also recommended by the National Program for Patient Safety (NPPS) and becomes crucial to qualify the care in all health establishments in the Brazilian territory[11]. The program has a specific axis for prevention and treatment of PI. In this way, combining the increased knowledge from the nursing team with the implementation of evidence-based practices results in benefits both in reducing the hospitalization time and in the number of patients affected by this problem[6,12].

In this context, for the implementation of good clinical practices, based on the precepts of the basic safety protocol related to the prevention of these lesions, one assumes that the knowledge acquired by the nurse during the academic training is essential to implement strategies to reduce these events in private and public services in the country.

Assuming that investigating the knowledge of nursing students may contribute to identifying gaps from the process of training and subsidize educational actions, aiming to meet the guidelines of the PNSP, the following question emerges: What is the level of knowledge of nursing students on evaluation, classification and preventive measures in patients with pressure injuries?

The objective of this study is to describe the knowledge of nursing students in relation to evaluation, classification and prevention of pressure injuries.

Method

This is a cross-sectional study, with a quantitative approach, performed in a private higher education institution in the state of Paraná. The population was composed of all students from the Nursing Graduate Course, duly registered in the second, third and fourth years of the course, totaling 158 students. Of these, 42 were attending the second year, 75 the third and 41 the last year (fourth year). To obtain a sample with 95% confidence, margin of error equal to 5%, and proportion of conservative prevalence equal to 0.5, the proportional stratified sampling was calculated, based on the proportion of the population of students from each year. The result of this calculation totaled 114 students.

The inclusion criteria were: being a nursing student and approved or attending Semiology and Care Methods subject, offered in the first semester of the second year (third term), of the syllabus of the nursing graduate course. The content covered by the study object of this research was taught in lectures and practical skills in the laboratory during the term. Underage students and those who returned blank questionnaires and/or with less than 50% of the questions fulfilled were excluded. After applying these criteria, no participant was excluded from the analysis.

The students were recruited by convenience, in the classroom, during the (morning and night) intervals. The participation occurred upon prior consent of the student and after signing the Informed Consent Form, with the proper guidance and clarification about the research. Data collection occurred in May 2019, in a reserved room, upon the delivery of a sealed envelope containing the questionnaire called Pieper Knowledge Test[13], translated and validated in Brazil[14].

The self-administered questionnaire contained 41 items, with questions whose answers followed the true, false, and I do not know model, divided into Category 1 (evaluation and classification of the PI), with 8 items, and Category 2, with 33 questions about preventive measures of PI. Each correct answer (T or F) was worth one point. The score greater than or equal to 37 points (90%) was considered satisfactory[13]. The envelopes were collected by the researchers and encoded

with letter and numeral to designate the year of the course (A2, A3 and A4), followed by the sequential numbering of respondents from each year investigated (P1, P2, ...P30), guaranteeing the participants' anonymity.

The data were transcribed into spreadsheets, at the Microsoft Office Excel 2016 program, by dual typing and correction of inconsistencies. After excluding blank items in the questionnaire, the quantitative variables were described by mean and standard deviation; the qualitative variables were presented as absolute and relative frequencies. To assess whether the (right) answers were associated with the year of the academic course, the Chi-square and the Kruskal-Wallis tests were used. To identify which groups, indeed, differed significantly, there was need to perform multiple comparisons of all categories, by Dunn post-hoc, with correction of the p-value, of the False Discovery Rate type. The data were processed by the statistical software R and statistical advisement; the level of significance was 5% ($p < 0.05$).

The institutional Human Research Ethics Committee approved the research under Opinion n. 3.305.836.

Results

The mean age of the students was 27.87 years, varying between 18 and 50 years (standard deviation of 8.57). There was a prevalence of female participants (80.7%; n=92) and without experience in the health area (52.6%; n=60).

Table 1 shows the knowledge of the nursing students in relation to assessment and classification of the PI. Six questions were considered unsatisfactory (score ≤90% of correct answers); however, there was significant difference in the percentage of correct answers, among students from the 2nd and 4th years ($p<0.001$).

Table 1 – Distribution of nursing students' answers, according to the knowledge regarding evaluation and classification of pressure injuries. Curitiba, Paraná, Brazil – 2019 (continued)

Evaluation and classification of pressure injuries	Year	Percentage of answers*			p-value**
		Right	Wrong	I don't know	
1. Stage I of the pressure ulcer (injury) is defined as intact skin, with hyperemia of a localized area, which does not show visible whitening or the color differs from the surrounding area (T)	2nd	60.0	40.0	-	0.270
	3rd	66.0	24.5	9.4	
	4th	66.7	30.0	3.3	
6. A stage III pressure ulcer (injury) is partial loss of skin, involving the epidermis (F)	2nd	26.7	70.0	3.3	00.504
	3rd	13.5	78.8	7.7	
	4th	14.3	82.1	3.6	
9. Stage IV pressure ulcers (injuries) have total skin loss with intense tissue destruction and necrosis or damage to muscles, bones or support structures (T)	2nd	90.0	3.3	6.7	00.389
	3rd	87.0	-	13.0	
	4th	93.3	3.3	3.3	
20. Stage II pressure ulcers (injuries) show loss of skin in its full thickness (F)	2nd	48.3	41.4	10.3	00.067
	3rd	34.6	44.2	21.2	
	4th	63.3	33.3	3.3	
31. Pressure ulcers (injuries) are sterile wounds (F)	2nd	69.0	6.9	24.1	00.064
	3rd	54.9	25.5	19.6	
	4th	80.0	13.3	6.7	
32. A region of the skin with a pressure ulcer (injury) scar may be damaged more quickly than intact skin (T)	2nd	53.6	17.9	28.6	00.208
	3rd	75.5	9.4	15.1	
	4th	80.0	6.7	13.3	

Table 1 – Distribution of nursing students' answers, according to the knowledge regarding evaluation and classification of pressure injuries. Curitiba, Paraná, Brazil – 2019 (conclusion)

Evaluation and classification of pressure injuries	Year	Percentage of answers*			p-value**
		Right	Wrong	I don't know	
33. A blister in the calcaneus region should not be a cause for concern (F)	2nd	62.1	13.8	24.1	<0.001
	3rd	87.0	11.1	1.9	
	4th	96.7	3.3	-	
38. Stage II pressure ulcers (injuries) can be extremely painful due to exposure of nerve endings (T)	2nd	75.9	10.3	13.8	<0.001
	3rd	61.1	20.4	18.5	
	4th	33.3	56.7	10.0	

Source: Created by the authors.

Note: Conventional signal used:
- Numerical data equal to zero not resulting from rounding.

* 2nd year (n=42); 3rd year (n=75); 4th year (n=41).

** Chi-square test p<0.05.

Depending on the year analyzed, Table 2 shows that 16 questions had 90% or more of right answers. The students from the 4th year presented significantly more satisfactory knowledge on three questions (p<0.05), namely: "All patients at risk for pressure ulcer (injury) must have systematic inspection of the skin at least once a week", "The regions of protuberances can stay in direct contact with one another" and "Hospitalized patients need to be assessed regarding the risk for pressure ulcer (injury) only once during their hospitalization."

Table 2 – Distribution of nursing students' answers, according to the knowledge regarding preventive measure for pressure injuries. Curitiba, Paraná, Brazil – 2019 (continued)

Preventive measures for pressure injuries	Year	Percentage of answers*			p-value**
		Right	Wrong	I don't know	
2. The risk factors for the development of pressure ulcers (injuries) are: immobility, incontinence, inadequate nutrition and altered level of consciousness (T)	2nd	70.0	23.3	6.7	0.574
	3rd	67.3	28.8	36.7	
	4th	63.3	29.5	-	
3. All patients at risk for pressure ulcer (injury) should have systematic skin inspection at least once a week (F)	2nd	34.5	55.2	10.3	0.007
	3rd	50.9	47.2	1.9	
	4th	76.7	23.3	-	
4. The use of hot water and soap can dry out the skin and increase the risk of pressure ulcers (injuries) (T)	2nd	40.0	30.0	30.0	0.165
	3rd	51.9	35.2	13.0	
	4th	63.3	26.7	10.0	
5. It is important to massage the bony prominence regions, if they are hyperemic (F)	2nd	24.1	55.2	20.7	0.756
	3rd	36.5	50.0	13.5	
	4th	31.0	48.3	20.7	
7. All patients should be evaluated at admission to the hospital for the risk of developing pressure ulcers (injuries) (T)	2nd	90.0	3.3	6.7	0.434
	3rd	88.7	9.4	1.9	
	4th	93.3	6.7	-	
8. Creams, transparent dressings and extra-fine hydrocolloid dressings help protect the skin from the effects of friction (T)	2nd	73.3	10.0	16.7	0.238
	3rd	67.3	19.2	13.5	
	4th	86.7	3.3	10.0	

Table 2 – Distribution of nursing students' answers, according to the knowledge regarding preventive measure for pressure injuries. Curitiba, Paraná, Brazil – 2019 (continued)

Preventive measures for pressure injuries	Year	Percentage of answers*			p-value**
		Right	Wrong	I don't know	
10. An adequate dietary intake of proteins and calories must be maintained during illness/ hospitalization (T)	2nd	72.4	13.8	13.8	0.500
	3rd	81.5	11.1	7.4	
	4th	90.0	6.7	3.3	
11. Patients who are restricted to the bed should be repositioned every 3 hours (F)	2nd	31.0	55.2	13.8	0.212
	3rd	39.6	52.8	7.5	
	4th	58.6	37.9	3.4	
12. A scale with times for changing decubitus should be used for each patient with or at risk for pressure ulcer (injury) (T)	2nd	90.0	3.3	6.7	0.269
	3rd	96.2	3.8	-	
	4th	86.7	10.0	3.3	
13. Water or air gloves relieve pressure on the heels (F)	2nd	20.7	34.5	44.8	0.002
	3rd	9.8	66.7	23.5	
	4th	10.0	83.3	6.7	
14. Water or air wheel type cushions help prevent pressure ulcer (injury) (F)	2nd	6.9	69.0	24.1	0.547
	3rd	11.3	75.5	13.2	
	4th	6.9	82.8	10.3	
15. In the lateral decubitus position, the patient with or at risk for pressure ulcer (injury) should be at an angle of 30 degrees in relation to the bed mattress (T)	2nd	43.3	20.0	36.7	0.963
	3rd	44.4	18.5	37.0	
	4th	37.9	17.2	44.8	
16. In the patient with or at risk for pressure ulcer (injury), the head of the bed should not be raised at an angle greater than 30 degrees, if there is no medical contraindication (T)	2nd	34.5	24.1	41.4	0.129
	3rd	35.2	27.8	37.0	
	4th	33.3	50.0	16.7	
17. The patient who does not move alone must be repositioned every 2 hours, when sitting in the chair (F)	2nd	23.3	50.0	26.7	0.061
	3rd	15.4	73.1	11.5	
	4th	23.3	73.3	3.3	
18. The patient with limited mobility and who can change the position of the body without assistance, should be instructed to perform pressure relief, every 15 minutes, while sitting in the chair (T)	2nd	56.7	33.3	10.0	0.039
	3rd	69.6	15.2	15.2	
	4th	34.6	42.3	23.1	
19. The patient with limited mobility, and who can remain in the chair, must have a cushion in the seat to protect the bony prominences (T)	2nd	89.7	10.3	-	0.040
	3rd	98.1	-	1.9	
	4th	80.0	13.3	6.7	
21. The skin of the patient at risk for pressure ulcer (injury) must remain clean and free of moisture (T)	2nd	86.2	10.3	3.4	0.851
	3rd	88.9	7.4	3.7	
	4th	90.0	10.0	-	
22. Measures to prevent new injuries do not need to be adopted continuously when the patient already has pressure ulcers (injuries) (F)	2nd	75.9	20.7	3.4	0.491
	3rd	79.2	13.2	7.5	
	4th	80.0	20.0	-	
23. Moving sheets or linings should be used to transfer or move patients who do not move alone (T)	2nd	89.7	10.3	-	0.215
	3rd	77.4	17.0	17.0	
	4th	93.3	6.7	-	
24. The mobilization and transfer of patients who do not move alone should always be carried out by two or more people (T)	2nd	96.6	3.4	-	0.653
	3rd	94.4	1.9	3.7	
	4th	96.7	3.3	-	

Table 2 – Distribution of nursing students' answers, according to the knowledge regarding preventive measure for pressure injuries. Curitiba, Paraná, Brazil – 2019 (conclusion)

Preventive measures for pressure injuries	Year	Percentage of answers*			p-value**
		Right	Wrong	I don't know	
25. In the patient with a chronic condition that does not move alone, rehabilitation should be initiated and include guidance on the prevention and treatment of pressure ulcers (injuries) (T)	2nd	78.6	10.7	10.7	0.114
	3rd	88.7	3.8	3.8	
	4th	100.0	-	-	
26. Every patient who cannot walk should undergo a risk assessment for the development of pressure ulcers (injuries) (T)	2nd	89.3	7.1	3.6	0.299
	3rd	92.6	1.9	5.6	
	4th	100.0	-	-	
27. Patients and family members should be informed about the causes and risk factors for the development of pressure ulcers (injuries) (T)	2nd	96.6	3.4	-	0.512
	3rd	94.3	1.9	3.8	
	4th	100.0	-	-	
28. The bony prominence regions can be in direct contact with each other (F)	2nd	65.5	10.3	24.1	<0.001
	3rd	83.0	15.1	1.9	
	4th	96.7	-	3.3	
29. Every patient at risk for developing pressure ulcer (injury) should have a mattress that redistributes pressure (T)	2nd	71.4	3.6	25.0	0.017
	3rd	83.7	6.1	10.2	
	4th	82.8	17.2	-	
30. The skin, when macerated by moisture, is more easily damaged (T)	2nd	79.3	6.9	13.8	0.467
	3rd	87.0	9.3	3.7	
	4th	76.7	13.3	10.0	
34. A good way to decrease pressure in the heel region is to keep it elevated from the bed (T)	2nd	67.9	25.0	7.1	0.387
	3rd	82.7	9.6	7.7	
	4th	75.0	21.4	3.6	
35. All care to prevent or treat pressure ulcers (injuries) does not need to be registered (F)	2nd	92.6	7.4	-	0.674
	3rd	84.9	13.2	1.9	
	4th	93.3	6.7	-	
36. Shear is the force that occurs when the skin adheres to a surface and the body slides (T)	2nd	35.7	3.6	60.7	0.122
	3rd	51.9	7.4	40.7	
	4th	58.6	13.8	27.6	
37. Friction can occur when moving the patient over the bed (T)	2nd	72.4	6.9	20.7	0.208
	3rd	86.5	1.9	11.5	
	4th	93.3	3.3	3.3	
39. In patients with incontinence, the skin should be cleaned at the time of elimination and at routine intervals (T)	2nd	82.8	10.3	13.8	0.920
	3rd	85.2	7.4	18.5	
	4th	90.0	6.7	10.0	
40. The development of educational programs at the institution can reduce the incidence of pressure ulcers (injuries) (T)	2nd	89.7	3.4	6.9	0.376
	3rd	87.0	5.6	-	
	4th	100.0	-	-	
41. Hospitalized patients need to be evaluated for the risk of pressure ulcer (injury) only once during their hospitalization (F)	2nd	62.1	31.0	6.9	0.029
	3rd	70.4	24.1	5.6	
	4th	96.7	3.3	-	

Source: Created by the authors.

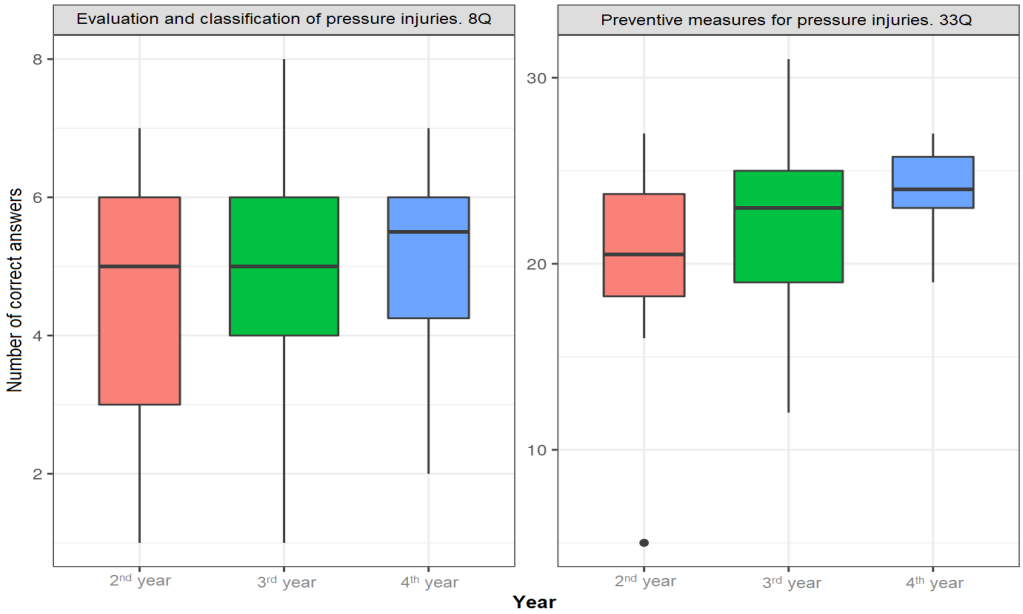
Note: Conventional signal used:
- Numerical data equal to zero not resulting from rounding.

* 2nd year (n=42); 3rd year (n=75); 4th year (n=41).

** Chi-square test p<0.05.

Figure 1 and Table 3 show the number/average of right answers, according to the category of knowledge, in relation to the year of the course. For category 2 (preventive measures for PI), the value of the Dunn test indicated that the mean scores of the students form the last year was significantly higher than the average of the 2nd year (p=0.006). The other comparisons had no significant differences.

Figure 1 – Distribution of the number of correct answers of nursing students for each category, in relation to the year of the graduate course



Source: Created by the authors.

Table 3 – Distribution of the descriptive measures and p-value for the mean/score differences, according to the category of knowledge of nursing students from the 2nd year. Curitiba, Paraná, Brazil – 2019

Variables	2nd year (n=30)					p-value*
	minimum	mean	median	Standard deviation	maximum	
Evaluation and classification of pressure injuries	1	5	5	2	7	0,221
Preventive measures for pressure injuries	5	21	20	4	27	0,009
Variables	**3rd year (n=30)**					**p-value***
	minimum	**mean**	**median**	**Standard deviation**	**maximum**	
Evaluation and classification of pressure injuries	1	5	5	1	8	0,221
Preventive measures for pressure injuries	12	22	23	4	31	0,009
Variables	**4th year (n=30)**					**p-value***
	minimum	**mean**	**median**	**Standard deviation**	**maximum**	
Evaluation and classification of pressure injuries	2	5	6	1	7	0,221
Preventive measures for pressure injuries	19	24	24	2	27	0,009

Source: Created by the authors.

* Kruskal-Wallis test, p<0.05.

Discussion

The sample of this research shows that the search for nursing graduate course is still predominantly female and composed by adults and young people. These data confirm the profile of students from other higher education institutions in Brazil, found in studies that indicate the approximate percentage of 20% of male students[15-16].

Aiming to provide excellent care by nurses, in relation to assessment, classification and preventive measures for PI, assessing the teaching and learning process in the theme, in educational institutions, becomes relevant to propose actions for improving the education of future nursing professionals, as well as the knowledge construction. To meet the requirements of the prevention and treatment of PI established by the PNSP, continuous improvements of nursing clinical practice are also sought[11].

Occasionally, a previous study conducted in a public Brazilian university, aiming to assess the understanding of 15 Nursing students about patient safety, identified that they associated their actions with the goals of the program, except for the prevention of PI[17]. This explains, in part, the data presented here, when revealing that the academic knowledge was insufficient, considering that more than half of the questions presented a score of correct answers below 90%, regardless of the year investigated.

Since prevention and treatment of PI are goals related to patient safety, these findings are worrying, given the need for operationalization of the six steps proposed by the ministerial protocol for prevention of PI, namely: evaluation of PI at the admission of all patients; daily revaluation of risk of development of PI of all hospitalized patients; daily inspection of the skin; management of moisture; optimization of nutrition and hydration; and use of pressure-reducing resources[6]. In addition, this circumstance intensifies the underreporting of PI, while limiting students, as future managers, to support the promotion of a safety culture in health institutions, which encourages learning from failures and establishes measures to prevent these events[12].

Brazilian studies performed with nursing professionals, with time of professional performance mostly exceeding three years, confirmed the lack of knowledge about the topic[18-19]. This scenario evidences that the knowledge related to the 41 items addressed in the questionnaire is limited, only among nursing students, but also among graduated professionals. This fact is alarming and represents an unfavorable factor in the provision of a damage-free nursing care to the person with skin lesions, because the knowledge of these professionals demonstrates how the care is being managed and performed in practice[20].

In category 1 (Evaluation and Classification of PI), only two questions obtained 90% or more of correct answers among the students from the 2nd and 4th years. This finding is similar to that described in a research conducted in a public Brazilian university, with 23 nursing students from the last year, which pointed out that only one student had 90% of correct answers[21]. Another study, conducted with 56 nursing students from two educational institutions located in Northeast Brazil, pointed out that the number of correct answers for items evaluation and classification of PI was 33.3%[16].

Only one question (item 33) showed a significant difference between the knowledge of students from the 4th year and the knowledge of students from the other years. This refers to the need to intensify the teaching regarding the conceptual bases of PI, in the learning process of these professionals, because the knowledge about the process of evaluation and classification is indispensable to the proper treatment, because it is the starting point for the therapeutic success[15]. There is increasing evidence that, in order to ensure patient safety in relation to PI, adequate training of professionals on how to perform a thorough evaluation of the skin, including techniques to identify responses to whitening, local heat, swelling, and stiffness,

is imperative to prevent, classify, diagnose and treat PI[9]. Therefore, it becomes a relevant and current demand in the context of the safe care.

In this sense, the evaluation and classification of PI by students and future nursing professionals are variables that become imperative for the list of assertive behaviors, in particular those related to treatment. In the context of the present study, only the question concerning the classification of stage IV showed a percentage considered satisfactory. This result indicates the need to improve knowledge of students in relation to other classifications of PI.

In Iran, a study that intended to identify the knowledge about the theme at two nursing schools highlighted that the students showed a higher rate of correct answers on questions relating to the evaluation of PI[22]. These differences can be justified by two reasons: the profile of the population studied; and the type of teaching method adopted by the institutions. The latter affects the level of knowledge acquired by students in the same way it strengthens, or not, the retention of the contents seized by subsequent years, which contribute to the adoption of decisions and actions that directly affect the methods of prevention of PI, knowledge of their occurrence and their consequences. In the same way, it contributes to using strategies for monitoring and adopting quality indicators recommended by the national protocol for prevention of PI. The objective of this protocol is to evaluate the changes directed to improvements in the performance of professionals in relation to safe practices and the impact in reducing the incidence of this problem in all health services in the country[6,12].

In category 2 (Preventive Measures for PI), the questions related to risk assessment of PI, the guidelines that should be offered to the patient with reduced mobility and their families, and continuing education through educational programs in the institutions, aiming to reduce these events, were those with the highest number of correct answers among the students from the last year. Nevertheless, the data from the present study showed unsatisfactory knowledge in various items of prevention, including those related to daily inspection of the skin and the use of technologies for relief and/or redistribution of pressure. Similar findings were found at the Nursing School of India, which showed that 48.9% (n=41) of the students reported unawareness of preventive practices[20].

The international and national guidelines on prevention of PI and patient safety emphasize the structured assessment through a validated scale at the patient's admission. It should contemplate the identification of significant changes in the patient's health condition, such as activity/mobility and skin condition[6,9-10]. The ready identification of stratification of patients at risk for developing PI allows for developing and implementing a preventive plan based on individual risk and providing institutional resources to adopt immediate measures[6].

Also in this category 2, the mean number of right answers of the students from the 4th year was significantly higher than the average of the 2nd year ($p=0.006$), which corroborates the multicenter research conducted in Italy, which identified that the higher education of nursing students was significantly related to higher total scores of knowledge ($p<0.001$)[23]. The academic knowledge about the topic is expected to increase progressively as years evolve, being mandatory the practice in different health contexts, for the implementation of supervised internships. Furthermore, extracurricular activities and academic training, which contribute to the acquisition and improvement of knowledge, are essential conditions for the development of attitudes, skills and competences[16].

Nonetheless, in addition to the unsatisfactory knowledge in various items of category 2, the students from the 4th year mentioned contraindicated interventions, such as massaging hyperemic areas, with error rate of 69%. They also showed unawareness of the recommendations for preventing PI when not indicating the use of water or air gloves to relieve the pressure of the calcaneus[6,9]. This question had the highest error rate (83.3%), with no significant difference for the remaining years ($p=0.002$).

The risk of damage that can be caused to the patient becomes clear, due to the incipient

knowledge certainly based on intuition and outdated experiences, which may limit the safe care in clinical practice. With this, it is essential to implement diversified pedagogical actions on evaluation, classification and prevention of PI, particularly regarding the articulation between theory and practice, in order to achieve satisfactory results of knowledge[15-16]. Considering the importance of patient safety and its improvement, implementing the recommendations for prevention and early management of PI seems to depend on strong leadership and team work and needs to integrate clinical, educational and managerial aspects [12].

Addressing and improving systematic actions on the PI theme become relevant and appropriate to fill the knowledge gaps found. These must affect significantly the students' knowledge, such as clinical experiences, to intensify personal and intellectual capacity, and activities that stimulate learning, whether be they lectures, in-person and online courses, clinical cases, practical lessons, research and extension courses[16].

Moreover, the data in this study refer to the understanding of the need to overcome the traditional model of education, which no longer meets the learning demand of nursing professionals. In this sense, the evidence-based practice is being adopted as a strategy for teaching and learning in the prevention of PI[24]. The simulations have also been used in order to improve skills and knowledge, promote critical discussions that qualify nursing students to accomplishing the safe care with the patient[25].

Thus, educators must acquire adequate knowledge about PI to develop theoretical and practical quality teaching to nursing students, because these, after graduation, need technical support and scientific and clinical judgment to act in the profession with better performance and autonomy[15]. Furthermore, these students will be responsible for ensuring the continuity of the cores of patient safety, aiming to maintain a system of surveillance, monitoring, prevention and mitigation of healthcare-related events, especially of PI. It should also contribute to the construction and implementation of technical and educational materials, such as posters on prevention of PI, aiming to offer good practices in health services, aiding in the prevention and minimization of this event and contributing to the patient safety[12].

Facing the need to achieve a satisfactory knowledge for the promotion of safe practices, the articulation between professors, preceptors and nursing students is believed to be a challenge due to two reasons: there is need to integrate theoretical knowledge into practice in health services; on the other hand, it favors the development of teaching strategies and innovative actions, aiming to provide improvements in the evaluation, classification and prevention of this type of AE by students and, thus, reduce the risks associated with the provided care.

Some of the recognized limitations include not researching the knowledge of professors concerning the assessment, classification and prevention of PI and a single education institution as research site. Future investigations, with particular focus on the methods used to conduct the teaching on the topic and on prior knowledge of nursing professors about PI, are necessary to complement the analysis of the findings of this research.

Conclusion

The knowledge of the nursing students on evaluation, classification and preventive measures of PI was considered unsatisfactory. The distribution of right answers between the years was similar regarding assessment and classification, while for the preventive measures, the nursing students from the 4th year presented a significantly greater number of correct answers. There is a need to improve and develop new teaching-learning strategies in the teaching institution investigated, aiming to go forward progressively to improve nurses' professional training.

The data found in this study reinforce the need to create institutional actions geared to the teaching-learning process, such as simulated environments, educational games and the development of artificial intelligence algorithms that help nursing students assess, identify and

prevent the risk factors for PI. The gap found in the knowledge of PI in nurses' academic learning about the topic raises the importance of intensifying the continuing education in health services, in order to improve the performance of these professionals in clinical practice.

The adoption of these strategies, considering the results found in the present study, potentially contribute to the list of decisions so that managers, practical professionals and the academy can improve the knowledge on the theme investigated. In this way, the precepts of the PNSP and the resolutions of the council of the professional class can be met, in relation to care with the person with a skin lesion, aiming to solidify conceptual bases and adopt preventive measures for reducing PI, promoting patient safety in private and public services in the country.

Collaborations:

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2 – writing of the article and relevant critical review of the intellectual content: Ana Flávia Furtado, Larissa Marcondes, Bruna Eloise Lenhani and Josemar Batista;

3 – final approval of the version to be published: Ana Flávia Furtado, Larissa Marcondes, Bruna Eloise Lenhani and Josemar Batista.

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