

Nursing students' knowledge regarding human error and patient safety

Conhecimento de acadêmicos de enfermagem referente ao erro humano e à segurança do paciente

Conocimientos de estudiantes de enfermería sobre el error humano y la seguridad del paciente

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Abstract: Objective: to identify the knowledge of nursing students, from a private higher education institution, regarding human error and patient safety. **Method:** cross-sectional study, conducted between May and June 2019, with application of a validated questionnaire in a proportional stratified sample of 135 students registered from the 1st to the 4th years. The analysis was by descriptive and analytical statistics. **Results:** the students agreed or strongly agreed that making mistakes in the health area is inevitable (n=78;57.8%). The lowest rate of concordant responses was related to the communication of errors to patients and family members (n=45;33.3%). There was a significant difference in the discordant responses of the 4th-year students regarding the institution's support for the implementation of measures that promoted safe practices (p<0.001). **Conclusion:** the 4th-year students demonstrated to have knowledge higher than the other years, although they need to improve the communication of errors to patients and family members.

Descriptors: Knowledge; Students, nursing; Medical errors; Patient safety; Education, nursing

Resumo: Objetivo: identificar o conhecimento dos acadêmicos de enfermagem, de uma instituição de ensino superior particular, a respeito do erro humano e da segurança do paciente. **Método:** estudo transversal, realizado entre maio e junho de 2019, com aplicação de questionário validado em amostra estratificada proporcional de 135 acadêmicos matriculados do 1^o ao 4^o ano. A análise foi por estatística descritiva e analítica. **Resultados:** os acadêmicos concordaram ou concordaram, fortemente, que cometer erros na área da saúde é inevitável (n=78;57,8%). O menor índice de respostas concordantes esteve relacionado à comunicação de erros aos pacientes e familiares (n=45;33,3%). Houve diferença, significativa, nas respostas discordantes dos acadêmicos do 4^o ano, referente ao

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apoio da instituição para a implementação de medidas que promovessem práticas seguras ($p < 0,001$). **Conclusão:** os acadêmicos do 4º ano demonstraram ter conhecimento superior aos demais anos, embora necessitem aprimorar a comunicação de erros a pacientes e familiares.

Descritores: Conhecimento; Estudantes de enfermagem; Erros médicos; Segurança do paciente; Educação em enfermagem

Resumo: **Objetivo:** identificar el conocimiento de los estudiantes de enfermería, de una institución privada de educación superior, con respecto al error humano y la seguridad del paciente. **Método:** estudio transversal, realizado entre mayo y junio de 2019, con aplicación de un cuestionario validado en una muestra estratificada proporcional de 135 estudiantes matriculados del 1º al 4º grado. El análisis fue por estadísticas descriptivas y analíticas. **Resultados:** los estudiantes estuvieron de acuerdo o firmemente de acuerdo en que cometer errores en el área de la salud es inevitable ($n=78;57,8\%$). La tasa más baja de respuestas concordantes se relacionó con la comunicación de errores a pacientes y familiares ($n=45;33,3\%$). Hubo una diferencia significativa en las respuestas discordantes de los estudiantes de 4º año con respecto al apoyo de la institución para la implementación de medidas que promovieron prácticas seguras ($p < 0,001$). **Conclusión:** los estudiantes del 4º año demostraron tener conocimientos más altos que los otros años, aunque necesitan mejorar la comunicación de errores a pacientes y familiares.

Descritores: Conocimiento; Estudiantes de enfermería; Errores médicos; Seguridad del paciente; Educación en enfermería

Introduction

The National Patient Safety Program (PNPS) aims to contribute to qualify the care provided in health facilities throughout the national territory. The document, based on the precepts of the World Health Organization (WHO), defines patient safety as the reduction, to an acceptable minimum, of the risk of unnecessary harm associated with health care, describing the need to produce, systematize and disseminate knowledge about patient safety in technical education, graduation and post-graduation, in the health area, with a view to ensuring excellent care.¹⁻²

Human error is defined by the International Classification for Patient Safety as a failure to execute an action plan as intended or application of an incorrect plan. Errors are, by definition, unintentional. Thus, situations in which errors or failures occur are called incidents, which may or may not cause harm to the patient (adverse events).²⁻³

Errors come from active failures and latent conditions in poorly designed systems and processes. The approach of human factors such as behavior, professional performance,

communication and human fallibility are partially contemplated in some courses and, in others, in addition to not addressing the theme, the professional's error is also based on individual guilt and not on a systemic perspective.⁴

Although there is consensus regarding the importance of the theme in nurses' training, especially for the development of safe skills and attitudes, there is an emphasis on learning applied to infection control and safety in the administration of medicines, which points to the incipience of a systematic approach in teaching.⁵ Moreover, the training of health professionals has not kept pace with the various challenges of the sector or the demands of changing the workforce. Estimates reveal that, of the US\$ 5.5 trillion spent on health in the world, only 2% are allocated to the training of professionals in this area.⁶

In view of the growing concern about the avoidable damage caused by health care, students in the area need to learn how to provide safer care. However, in addition to financial resources and content, the challenge is to think about strategies for this training to be effective and really involve and integrate professionals from different health areas, with a view to influencing the professional's knowledge and promoting the patient safety culture.⁷

The introduction of patient safety education in the nursing graduation syllabus is necessary and timely, given the significant impact of early exposure of these students to the basic concepts of safety upon listing strategies for reducing errors. In this sense, education for patient safety, in nursing curricula and other subjects, is an important theme that should receive support so that it can be taught, developed and sustain substantial progress in error reduction strategies.⁸ The Multiprofessional Curriculum Guide on Patient Safety emphasizes that fully understanding the concepts related to the theme is a necessary and indispensable point, and nursing students, as future professionals and leaders in the population's health care, should prepare for safe practices.⁶

Recognizing the role of higher education institutions in training and building a culture towards patient safety, on the part of health professionals, especially nurses, the following

question emerged: What is the knowledge acquired by nursing students from a private higher education institution about human error and patient safety? The aim of this research was to identify the knowledge of nursing students, from a private higher education institution, regarding human error and patient safety.

Method

This is a cross-sectional survey, conducted between May and June 2019, at a private higher education institution in Curitiba - Paraná. The syllabus of the nursing course comprises four years, and the target population was 203 students, distributed in the 1st (n=45), 2nd (n=42), 3rd (n=75) and 4th (n=41) years of graduate course. 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 of students per year was calculated, resulting in 135 participants.

The inclusion criteria adopted were: all the students of the course, regularly registered in the 1st, 2nd, 3rd and 4th years of the nursing graduate course. Those underage or who returned a blank questionnaire were excluded. The students' recruitment occurred by convenience, during the 20 minutes of the morning and night interval, in a reserved room and by signing the Informed Consent Form and in the application of the questionnaire. This was elaborated and validated by Brazilian researchers in order to evaluate the health graduate students' understanding regarding patient safety.⁹ It should be noted that the questionnaire's authors previously authorized its use in the development of this research.

The questionnaire is self-administered and composed of sociodemographic and academic items (gender, age, course, grade, experience in the area of health and formal learning about patient safety), and 20 statements related to conceptual and attitude-related aspects about human error and patient safety. The items are answered by a five-point Likert scale, with categories in degrees of agreement (agree, strongly agree, no opinion, disagree and strongly disagree).⁹ The questionnaires answered were

placed in an envelope and delivered to the researchers without identification, ensuring anonymity. It is noteworthy that, after the application of the inclusion and exclusion criteria adopted, no questionnaire was excluded from the analysis.

The data were doubly typed in a spreadsheet in the Microsoft Office Excel 2016 program to correct inconsistencies. After excluding invalid answers (blank) and grouping the answers in strongly agree/agree, no opinion, and disagree/strongly disagree, the data were analyzed by descriptive and analytical statistics.

Quantitative variables were described by mean and standard deviation; and the qualitative variables were presented in absolute (n) and relative (%) frequencies. To evaluate the association between the answers and the student's course year, the Chi-square test was used, with significance value of $p < 0.05$. The data were processed with the help of the R software and had the advice of a statistical professional.

The research followed all the precepts of Resolution 466/2012 of the National Health Council. It was approved by the Institutional Human Research Ethics Committee, under opinion n. 3.296.223, on 04/30/2019.

Results

The sample population was 135 students, with a mean age of 26.6 years (standard deviation of 8.23). There was a prevalence of females (84.4%; $n=114$), and of the students with no experience in health (74.6%; $n=101$). Among those who had experience, 91.2% ($n=31$) were nursing technicians and 57.6% had experience in the area equal to or greater than five years.

There was a prevalence of nursing students who strongly agreed or agreed that making mistakes in the health area is inevitable ($n=78$; 57.8%). The lowest rate of concordant responses was related to the statement directed to the communication of errors to patients and family members, as shown in Table 1.

Table 1 - Distribution of the nursing students' answers regarding the conceptual and attitude-related aspects of human error and patient safety. Curitiba, Paraná, Brazil, 2019. (n=135)

Variable	Agree/ Strongly agree		No opinion		Disagree/ Strongly disagree	
	n	%	n	%	n	%
Conceptual aspects						
Making mistakes in the health area is inevitable	78	57.8	06	4.4	51	37.8
There is a strong difference between professionals' knowledge, the right and what is seen in the healthcare routine	116	85.9	13	9.6	06	4.5
Competent professionals do not make mistakes that harm patients	50	37.0	08	6.0	77	57.0
Committed students do not make mistakes that harm patients*	43	32.1	10	7.5	81	60.4
In case of error, all involved (professionals, students, managers, patient and family) should discuss its occurrence	112	82.9	09	6.7	14	10.4
For the analysis of human error, it is important to know the individual characteristics of the professional who committed it	91	67.4	22	16.3	22	16.3
After an error occurs, an effective prevention strategy is to work more carefully	124	91.8	04	3.0	07	5.2
Attitude-related aspects						
Professionals should not tolerate working in places that do not offer adequate conditions for the care provided to the patient	93	68.9	15	11.1	27	20.0
In order to implement measures to prevent human errors, a systemic analysis of the facts must always be instituted	120	88.9	14	10.4	01	0.7
It is necessary to implement systemic analysis of errors in the health area, but preventive measures must be adopted whenever someone is injured	111	82.2	09	6.7	15	11.1
I always communicate to my professor the presence of conditions, in the internship field, that favor the occurrence of the error*	100	74.6	30	22.4	04	3.0
I always communicate to the professor/manager/head of the internship location, the occurrence of an error	103	76.3	28	20.7	04	3.0
I always report an error to my colleague	83	61.5	27	20.0	25	18.5
I always report an error to the patient/family*	45	33.6	45	33.6	44	32.8
If there is no harm to the patient, it should be analyzed whether there is a need to report the occurrence of the error to the patient and the family	61	45.2	23	17.0	51	37.8
Professors always take corrective measures with the student to avoid making new mistakes	100	74.1	28	20.7	07	5.2
Systems for reporting errors make little difference in reducing future errors	26	19.3	17	12.6	92	68.1
Only doctors can determine the cause of the error	08	5.9	19	14.1	108	80.0
I always carry out internship activities in places that promote good practices for the promotion of patient safety	69	51.1	53	39.3	13	9.6
Whenever I identify situations that need improvement, I receive	59	43.7	57	42.2	19	14.1

support from the institution for the implementation of measures that promote safe practices

*Sample size: n=134

Table 2 presents the distribution of responses related to conceptual aspects related to human error and patient safety according to the year of graduation. The 3rd- and 4th-year students presented a significantly positive difference in relation to the question “Competent professionals do not make mistakes that harm patients” (p=0.033), with a discordant response rate equal to or greater than 70%.

Table 2 – Distribution of nursing students’ answers regarding the conceptual aspects related to human error and patient safety, according to year of graduation. Curitiba, Paraná, Brazil, 2019. (n=135)*

Conceptual aspects	Year	Agree/ Strongly agree		No opinion		Disagree/ Strongly disagree		p-value [†]
		n	%	n	%	n	%	
		1 st	18	60.0	01	3.3	11	
Making mistakes in the health area is inevitable	2 nd	19	67.8	01	3.6	08	28.6	0.496
	3 rd	24	48.0	04	8.0	22	44.0	
	4 th	17	63.0	-	-	10	37.0	
	1 st	27	90.0	02	6.7	01	3.3	
There is a strong difference between professionals’ knowledge, the right and what is seen in the healthcare routine.	2 nd	22	78.6	06	21.4	-	-	
	3 rd	46	92.0	02	4.0	02	4.0	
	4 th	21	77.8	03	11.1	03	11.1	
Competent professionals do not make mistakes that harm patients.	1 st	16	53.3	03	10.0	11	36.7	0.033
	2 nd	13	46.4	03	10.7	12	42.9	
	3 rd	14	28.0	01	2.0	35	70.0	
Committed students do not make mistakes that harm patients.	4 th	07	25.9	01	3.7	19	70.4	0.741
	1 st	08	26.7	04	13.3	18	60.0	
	2 nd	09	32.1	03	10.7	16	57.2	
	3 rd [†]	17	34.7	02	4.1	30	61.2	
In case of error, all involved (professionals, students, managers, patient and family) should discuss its occurrence.	4 th	09	33.3	01	3.7	17	63.0	0.066
	1 st	26	86.6	02	6.7	02	6.7	
	2 nd	25	89.3	03	10.7	-	-	
	3 rd	36	72.0	04	8.0	10	20.0	
For the analysis of human error, it is important to know the individual characteristics of the professional who committed it	4 th	25	92.6	-	-	02	7.4	0.247
	1 st	24	80.0	05	16.7	01	3.3	
	2 nd	19	67.9	06	21.4	03	10.7	
	3 rd	32	64.0	07	14.0	11	22.0	
After an error occurs, an effective prevention strategy	4 th	16	59.3	04	14.8	07	25.9	0.435
	1 st	29	96.7	01	3.3	-	-	

is to work more carefully	2 nd	24	85.7	01	3.6	03	10.7
	3 rd	45	90.0	01	2.0	04	8.0
	4 th	26	96.3	01	3.7	-	-

*1st year (n=30), 2nd year (n=28), 3rd year (n=50), 4th year (n=27) † Chi-square Test, p<0.05 ‡ Sample size: n=49

The students' answers regarding attitude-related aspects related to human error and patient safety, according to the year of graduation, are present in Table 3. Compared to students from the other years, in the question "Whenever I identify situations that need improvement, I receive support from the institution for the implementation of measures promoting safe practices", there was a significantly greater difference in the discordant answers of those registered in the 4th year (p<0.001).

Table 3 – Distribution of nursing students' answers regarding the attitude-related aspects related to human error and patient safety, according to year of graduation. Curitiba, Paraná, Brazil, 2019. (n=135)*

Attitude-related aspects	Year	Agree/ Strongly agree		No opinion		Disagree/ Strongly disagree		p-value ‡
		n	%	n	%	n	%	
Professionals should not tolerate working in places that do not offer adequate conditions for the care provided to the patient	1 ^o	20	66.7	03	10.0	07	23.3	0.367
	2 ^o	20	71.4	05	17.9	03	10.7	
	3 ^o	38	76.0	03	6.0	09	18.0	
	4 ^o	15	55.6	04	14.8	08	29.6	
In order to implement measures to prevent human errors, a systemic analysis of the facts must always be instituted	1 ^o	26	86.7	04	13.3	-	-	0.023
	2 ^o	21	75.0	07	25.0	-	-	
	3 ^o	47	94.0	03	6.0	-	-	
	4 ^o	26	96.3	-	-	01	3.7	
It is necessary to implement systemic analysis of errors in the health area, but preventive measures must be adopted whenever someone is injured	1 ^o	28	93.4	01	3.3	01	3.3	0.008
	2 ^o	23	82.1	04	14.3	01	3.6	
	3 ^o	41	82.0	04	8.0	05	10.0	
	4 ^o	19	70.4	-	-	08	29.6	
I always communicate to my professor the presence of conditions, in the internship field, that favor the occurrence of the error	1 ^o	20	66.7	10	33.3	-	-	0.127
	2 ^o	18	64.3	09	32.1	01	3.6	
	3 ^o	40	80.0	09	18.0	01	2.0	
	4 ^o ‡	22	84.6	02	7.7	02	7.7	
I always communicate to the professor/manager/head of the internship location, the occurrence of an error	1 ^o	20	66.7	10	33.3	-	-	0.003
	2 ^o	18	64.3	10	35.7	-	-	
	3 ^o	42	84.0	07	14.0	01	2.0	
	4 ^o	23	85.2	01	3.7	03	11.1	

	1 ^o	16	53.3	09	30.0	05	16.7	
I always report an error to my colleague	2 ^o	18	64.3	07	25.0	03	10.7	0.388
	3 ^o	30	60.0	09	18.0	11	22.0	
	4 ^o	19	70.4	02	7.4	06	22.2	
	1 ^o §	12	41.4	10	34.5	07	24.1	
I always report an error to the patient/family	2 ^o	10	35.7	10	35.7	08	28.6	0.340
	3 ^o	17	34.0	17	34.0	16	32.0	
	4 ^o	05	18.5	08	29.6	14	51.9	
	1 ^o	13	43.3	06	20.0	11	36.7	
If there is no harm to the patient, it should be analyzed whether there is a need to report the occurrence of the error to the patient and the family	2 ^o	15	53.6	04	14.3	09	32.1	0.874
	3 ^o	21	42.0	07	14.0	22	44.0	
	4 ^o	12	44.5	06	22.2	09	33.3	
	1 ^o	24	80.0	05	16.7	01	3.3	
Professors always take corrective measures with the student to avoid making new mistakes	2 ^o	19	67.8	08	28.6	01	3.6	0.705
	3 ^o	35	70.0	12	24.0	03	6.0	
	4 ^o	22	81.5	03	11.1	02	7.4	
	1 ^o	07	23.3	02	6.7	21	70.0	
Systems for reporting errors make little difference in reducing future errors	2 ^o	03	10.7	05	17.9	20	71.4	0.713
	3 ^o	09	18.0	07	14.0	34	68.0	
	4 ^o	07	25.9	03	11.1	17	63.0	
	1 ^o	03	10.0	05	16.7	22	73.3	
Only doctors can determine the cause of the error	2 ^o	-	-	10	35.7	18	64.3	0.004
	3 ^o	03	6.0	04	8.0	43	86.0	
	4 ^o	02	7.4	-	-	25	92.6	
	1 ^o	15	50.0	14	46.7	01	3.3	
I always carry out internship activities in places that promote good practices for the promotion of patient safety	2 ^o	10	35.7	16	57.1	02	7.1	0.020
	3 ^o	25	50.0	20	40.0	05	10.0	
	4 ^o	19	70.4	03	11.1	05	18.5	
	1 ^o	16	53.3	13	43.3	01	3.3	
Whenever I identify situations that need improvement, I receive support from the institution for the implementation of measures that promote safe practices	2 ^o	06	21.4	20	71.4	02	7.1	<0.001
	3 ^o	25	50.0	18	36.0	07	14.0	
	4 ^o	12	44.4	06	22.2	09	33.3	

*1st year (n=30), 2nd year (n=28), 3rd year (n=50), 4th year (n=27) † Chi-square Test, p<0.05 *Sample size: n=26 §Sample size: n=29

Discussion

When analyzing the students' answers about the conceptual and attitude-related aspects concerning human error and patient safety, the knowledge of those registered in the 4th year was higher compared to the other years investigated. This finding corroborates the study conducted

in six universities in Saudi Arabia, which showed that last-year nursing students presented significantly positive differences in patient safety competencies.¹⁰

Although the construction of knowledge in the theme often focuses on subjects that make up the Brazilian nursing syllabus,¹¹ the teaching-learning process with a view to shaping safe behaviors and attitudes occurs gradually and articulated between the theory seized in the classroom and the practice experienced in different care contexts. Thus, the internship field needs to improve its processes, whose purpose is to promote safe and quality environments and, thus, serve as an example for future health and nursing professionals.¹²

The nursing students of the present research, especially those from the 3rd year, stated that there is a difference between the professionals' knowledge, the right and what is seen in the healthcare routine, totaling 92% (n=46) of the agreements. It is worth mentioning that, in the institution investigated, in this particular year, the students are starting the practical academic experience through supervised internships and shaping their vision as a future professional in the area, associating theoretical contents addressed in the classroom with the professionals' practical performance.

The dissociation between theory and practice, on the one hand, focuses on distancing from the practices that are recommended by the WHO and the PNSP and from what is perceived by the students, given the reality of the services provided in the health area. On the other hand, it allows the student to develop clinical and reflective reasoning, enabling the design of specific knowledge, skills and competencies to promote safe care according to the institutional reality,¹³ since these future professionals will be responsible for the implementation and continuity of patient safety centers. These services are essential to systematize safety actions; however, they present structural and organizational limitations that impede the operationalization of strategies aimed at promoting safe practices beyond meeting regulatory requirements.¹⁴

The inseparability between theory and practice in the training of health and nursing professionals related to patient safety becomes necessary so that students, preceptors and professionals perform

adequate and safe practices regardless of the care context. Moreover, it is relevant to direct the national curriculum guidelines to the transversal disciplines, with a view to the training of nursing professionals, thus contributing to promote significant changes in the current health care models.

Nursing education institutions and health organizations granting practical fields need to jointly articulate actions to be performed by students and preceptors. They should also redesign training curricula in order to improve teaching-learning in complex environments and reduce the gap between theory and practice, regarding health care quality and safety,¹⁵ in particular, in aspects that involve the perception of human error and poorly elaborated systems, for example, absence of checklist to avoid lapses and slip-ups of professionals during the assistance and inadequate supervision of health students and workers, which enhance the maintenance of unsafe environments. In this sense, professors, preceptors, health professionals and nursing students and of other areas must contribute to the institutional working processes as co-responsible for good care practices.

Regarding the variable: “Making mistakes in the health area is inevitable”, 57.8% (n=78) of the participants agreed or strongly agreed with the statement. This datum differs from a study conducted with 65 students from a private university in the state of Rio de Janeiro, revealing that 73.8% (n=48) disagreed or strongly disagreed with this statement.¹⁶ Nursing students’ unawareness of the various factors that contribute to the occurrence of errors, including the active failures and latent conditions of the system and the use of barriers, with a view to avoiding them¹⁷, point to the need to improve the training process, aiming to break the traditional view of human error and the perspective of assertiveness, practically excluding the possibility of error by health professionals, under training or already trained.¹²

Positive inferences were related to the statements: “Committed students do not make mistakes that harm patients” and “Competent professionals do not make mistakes that harm patients”. The 3rd- and 4th-year students disagreed or strongly disagreed with significant

difference when compared to the other years ($p=0.033$). The less favorable results were observed in the first years, possibly because these students did not have, in their entirety, professionalizing subjects. At the same time, they promote the need to equip professors of early subjects to contemplate, in the basic education of the professional nurse, contents focusing on safe care.

It should be noted that addressing these concepts in the initial grades/years of training contribute to behavioral changes and may affect clinical practice. To reduce these gaps in knowledge, advancing interprofessional education is believed to provide the construction of collective concepts, as well as the development of safer attitudes, between the different teams involved in patient care. Thus, understanding how systems interfere in the quality and safety of health care are increasing demands in the education of any health professional.

It is necessary to learn, manage and develop strategies, in order to avoid errors and complications, and in case of occurrence, be able to react appropriately.⁶ Otherwise, it can contribute to the maintenance of punitive actions before human error, which in turn hinders collective learning and the rise of good care practices, which need to be permeated by a fair culture in hospital organizations. Professors and students need to recognize and understand that, regardless of being a student or professional, both are subject to errors, and, in addition to prevention strategies, experience is essential for promoting an adequate perception of the patient safety culture, even during the professional training process.¹¹

Upon facing an error, 82.9% of the students demonstrated that they agree that all those involved (professionals, students, managers, patients and family members) should discuss its occurrence, which is not an exclusive attribution of the physician to determine the contributing factors. On the contrary, patient safety and error analysis are a shared responsibility among professionals, patients and family members, and the non-communication of an error or adverse event can have consequences for the team and, especially, for patients.¹⁸ It is known how prudent it is to communicate openly before an error or situations that potentiate the occurrence

of unnecessary damage to the patient, in order to analyze these mistakes and, with it, elaborate strategies to correct them or, rather, avoid them in the future.

Although the students agreed that analyzing human error requires knowing the individual characteristics of the professional who committed it, and that, after the occurrence of the incident, an effective prevention strategy is to work with greater care, it is worth highlighting other variables that contribute to its occurrence, for example, the excessive workload on the day, the emotional state or inadequate working conditions, in addition to the effectiveness of the tools used to prevent these errors. After their occurrence, it is necessary to work the prevention of recidivism, using a strategic planning aiming to minimize or extinguish them.¹⁹

The analysis of the attitude-related aspects, in which the theory applied in the classroom correlates with academic practice, revealed significantly positive differences related to knowledge, between the graduate years, in view of the systemic analysis of errors in the health area. Moreover, in the question “Professionals should not tolerate working in places that do not offer adequate conditions for the care provided to the patient”, the 3rd-year students demonstrated greater agreement in relation to the other years.

This finding reveals the knowledge they have regarding patient safety and the Code of Ethics of Nursing Professionals, specifically Article 13, which supports their right to suspend professional activities when the place does not offer safe conditions for the practice of the profession. The current legislation is in line with the aforementioned statement, taking into account that nursing practice directly involves the provision of patient care, and indirectly, the patient safety, with both topics addressed during the nursing education process.²⁰ Nonetheless, the reason for 3rd-year students expressing more satisfactory results regarding this statement when compared to the 4th year is not clear, which can be investigated in future researches.

Among 4th-year student, 70.4% stated attending internship activities in places that promote good patient safety practices, and, when addressing the need for improvements in these practices,

33.3% of the students from this year significantly ensured that, when identifying situations that needed attention, they did not always receive the support of the institution in order to implement improvements that promoted safe practices ($p < 0.001$). Expanding the analysis of this statement, the percentage of discordant responses increased according to the years, evidencing the need to develop intervention projects with the active participation of students, professors and local managers, in order to carry out continuous improvements to the clinical practice of nursing.

In this perspective, when compared to the students from the initial years, those concentrated in the 3rd and 4th years always claimed to communicate to the professor the presence of conditions that favored error, in the internship field, and significantly reported to the professor/manager or head of the internship site the occurrence of the error ($p = 0.003$). This difference can be justified by the fact that both the 1st and 2nd years do not perform practical activities in the internship field, which incites caution in interpreting this result.

However, in the question "Professors always take corrective measures with the student to avoid making new mistakes", 81.5% ($n = 22$) of the 4th-year students presented concordant answers. This result was similar to that reported by students from the health courses of a public university in southern Brazil.¹² Thus, it is possible to affirm that the professor/preceptor of the internship field has a fundamental role as a facilitator in the process of practical learning for evidencing the error and actively participating in the process of the students' evolution, through corrective measures applied.¹²

Regarding the communication of error to the patient and his/her family, the data showed a similar dispersion between the options, in a way that the percentage of students who agreed is equal to those who had no opinion on the subject. Nevertheless, 51.9% ($n = 14$) of 4th-year students disagreed or strongly disagreed with this statement. This denotes that the act of communicating the occurrence of errors to the patient and his/her family members should be approached with

more emphasis during graduation, given the need to prepare students for future situations, in which they will be responsible for providing the news.

To fill this gap, a strategy that can be implemented during the training process of health professionals, especially nurses, is the use of educational guides to promote effective and specific communication about error.²¹ Problem-Based Learning with simulated environments also contributes to promoting communication and decision-making in critical situations,⁸ commonly found in clinical practice and that expose students to challenging situations to promote actions aimed at safe care.

As limitations of the research, there was no analysis of the previous knowledge of professors and preceptors within the proposed theme, and its development occurred in a single private higher education institution. The non-identification of the contents contemplated in the curricular units of the respective years of the nursing graduate course, related to patient safety, is also a limitation of this research.

Conclusion

Nursing students attending the 4th year showed superior knowledge regarding human error and patient safety, compared to the other years of graduation. However, there is need to intensify the teaching-learning process concerning the systemic analysis of errors.

The identification of gaps in learning, referring to the communication of human error to patients and family members, in this research, can mirror other higher education institutions to implement teaching practices outside the traditional teaching method, such as dynamics, simulated activities, and development of artificial intelligence algorithms capable of contributing to students' leadership in unforeseen care situations.

These teaching methods serve as a stimulus for students to adopt assertive behaviors related to possible non-conformities of the health system, in order to promote safer work

processes. Future investigations including the previous knowledge of professors and preceptors and teaching-learning methods adopted by the researched institution, related to the theme investigated, may complement the findings of the present study.

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Scientific Editor: Tania Solange Bosi de Souza Magnago

Associate Editor: Rosangela Marion da Silva

Funding / Acknowledgments: none.

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How to cite this article

Moraes SL, Marcondes L, Almeida AE, Koller FJ, Silva DP, Batista J. Nursing students' knowledge regarding human error and patient safety. Rev. Enferm. UFSM. 2020 [Cited: Month Day Year]; vol.10 e84: 1-18. DOI: <https://doi.org/10.5902/2179769241144>