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Patient Safety Protocols in Overcrowded Environments: in the context of nursing

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Abstract**—** *Objective: to identify if the nurses of an overcrowded hospital in Belém do Pará performed the patient's safety protocols. Material and methods: the research is descriptive of a field study with quantitative approach, conducted with 16 nurses from a reference public hospital in the care of high-risk pregnant women, located in the municipality of Belém, state of Pará, held in October and November 2018. A self-applicable form containing socio-demographic and labor data of the nurse and questions about the basic protocols of patient safety was used. The analysis and statistical comparisons between the variables were made using the GraphPad Prism 8, the categorical variables were tested with the bilateral Fisher's exact test, the continuous variables were tested through Pearson's correlation. Results: 12 (75%) nurses were mostly female, with a mean age of 45.5 years, most of them with training between 10-19 years 6 (37.5%). The protocol least performed by the participants is that of patient identification (56%). Less than half (37.5%) of the nurses responded positively to more than 75% of the form assertions. It was identified that the non-performance of the pressure injury protocol, which may be related to the lack of institutional continuing education on this subject (p = 0.0345). The longer the working day of the nurse, the lower the number of correct procedures performed (r = -0.3037). Conclusion: This article concluded that the basic patient safety protocols are being performed in overcrowded environments, and that the workload can negatively influence these results.*

Keywords**— Patient Safety; Nursing Care; Protocols.**

I. INTRODUCTION

Patient safety has permeated several debates on the global health scene, being one of the main concerns of health organizations to improve the quality of their services (Cestari et al., 2017). The National Patient Safety Program (NPSP), instituted in Brazil by Ordinance MS No. 529 of

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April 1, 2013, demonstrates the government's commitment to contributing to the qualification of health care in all health facilities in the national territory, promoting greater safety for patients, health professionals and health care environment (ANVISA, 2017).

Among the regulations created by the National Health Surveillance Agency Anvisa, (2015), it is worth mentioning the publication of the Resolution of the Collegiate Board of Directors (RDC) nº 36, of July 25, 2013 (BRASIL, 2013), which aims to "institute actions for patient safety and quality improvement in health services". The RDC establishes the obligation to implement the Patient Safety Center (PSC) in health services.

In order to consolidate safe assistance with quality, in September 2013, with Ordinance No. 2,095, the Ministry of Health instituted basic patient safety protocols, including: fall prevention protocols; patient identification protocol; safety protocol in prescribing and using and administering medication; safe surgery protocol, hand hygiene practice and pressure injury (Silva, Alves, Sanches, Terra, & Resck, 2016). These protocols have the purpose of instituting actions for patient safety in health services and quality improvement on a national basis (M. da S. Brasil, 2014).

The development of the actions and strategies foreseen in the NPSP is the responsibility of the PSC, which plays a fundamental role in the entire process of implementing the Patient Safety Program (PSP). Thus, knowledge about risk management tools, safety protocols and other instruments that favor the incorporation of indicators and promote the culture of patient safety is of great value (ANVISA, 2014).

It is known that from four to seventeen percent (4% to 17%) of all patients who are admitted to a health service suffer from a health care related incident that is not related to their underlying disease and may affect their health and recovery. In some cases, these failures may even lead to the patient's death. In response to this problem, the World Health Organization (WHO) has created the PSP that focuses on the prevention of preventable Adverse Events (AE) (ANVISA, 2017).

According to WHO, (2016), patient safety is a serious public health problem and its estimates are that one in ten patients in hospitals is subject to AE. The decrease in the number of infections acquired in hospitals, the decrease in the number of hospitalizations, medical costs and expenses and disability or loss of productivity are some benefits provided by patient safety in these institutions.

And among the problems that interfere in the accomplishment of the patient's safety, the overcrowding of Brazilian services stands out, which are often characterized as an overcrowded environment and with insufficient conditions of attendance, which arouse several kinds of feelings both in the users of the service and in the multiprofessional team that attends them (SANTOS, 2015). According to Bittencourt & Hortale (2009), overcrowding in health services is a worldwide phenomenon and ultimately indicates low performance of the health system as a whole and of the hospital in particular, and induces low quality care, which may affect the applicability of nursing care systematization. Already for Santos & Santo, (2014) overcrowding is a contemporary phenomenon, with certain causes and consequences.

Being the systematization of nursing care, an instrument for the applicability of care based on science, and which will have a direct impact on the quality of the service provided and consequently minimizing adverse events, and valuing the safety of the patient (Sardinha, Silva, Carvalho, Aguiar, & Simor, 2019). A study also shows that the applicability of the systematization of nursing care ensures that the nurse applies his care according to practices based on evidence, improving the service, and is also a way of promoting patient health, since the evaluation is thorough, to identify the problems from the theories of nursing, and for each problem to draw a diagnosis of nursing and from it various interventions that are applied and evaluated daily (Sardinha, Costa, et al., 2019).

For this reason, the present work was chosen in view of its relevance in line with the current reality of hospitals, from the point of view of the challenge of carrying out patient safety protocols for adequate assistance in the face of overcrowding.

Thus, being of interest to health professionals and hospital managers involved in the system to seek improvement in the quality of care. Thus, the question that guided the research was established: Nurses of an overcrowded hospital in Belém do Pará perform the patient safety protocols?

Thus, with the elaboration of this study it was hoped to bring relevant information regarding the execution of the patient safety protocols by the nurses and the main objective was to identify if the nurses of an overcrowded hospital in Belém do Pará performed the patient safety protocols and as specific objectives describe the socio-demographic and work profile of the nurses, identify if the basic patient safety protocols were being performed effectively and verify the knowledge of the nurse about the patient safety protocols.

II. METHOD

This is a descriptive field study type research with a quantitative approach. The study was conducted with 16 nurses working in the Prepartum, Childbirth and

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Puerperium (PCP) and Obstetric Center (OC) of an overcrowded hospital located in the municipality of Belém, State of Pará, through the application of a form that was prepared by the authors based on the manual of strategies for the realization of patient safety of REBRAENSP in 2013(REBRAENSP, 2013).

It is divided into two parts: the first one on the extraction of socio-demographic and labor characterization of nurses, and the second one on information regarding patient safety protocols. It should be noted that in what concerns the basic protocols of patient safety, the safe surgery protocol was not included in the form because it was not the profile of the place studied.

The data collection was carried out in October and November 2018. We emphasize that the survey was submitted to the analysis of three hospitals in the metropolitan region of Belém, among them public and private, however, because it is a subject that brings significant answers about qualified assistance in hospitals in overcrowding, only one public hospital allowed the study.

The inclusion criteria adopted were to be nurses of the institution, both genders, professionals who had been working for at least 30 days in the sector in a situation of overcrowding and those excluded were nurses of the institution who were not working at the time of data collection, whether due to vacation, maternity leave, health leave, unpaid leave or dismissed from office for other reasons, nurses who refused to participate in the collection and nurses working in sectors where overcrowding is not a reality.

The descriptive statistics consisted of obtaining the means for the quantitative data and for the qualitative data, an absolute frequency was performed by means of direct counting, followed by the relative frequencies. For the descriptive statistics tabulation and data presentation the Microsoft Office Excel 2007 program was used, and the obtained results were used frequency, percentage and mean.

Statistical comparisons between variables were performed in GraphPad Prism 8 (*GraphPad Prism8 [Programa de Computador]*, 2018), and the categorical variables were tested with the bilateral Fisher's exact test, more appropriate for the small sample size, was considered alpha value = 5%. The continuous variables were tested using Pearson's correlation, using the value of $r > 0.25$ for weak correlation and the coefficient $r > 0.75$ considering strong correlation.

The categorical variables concerning the questions on the application of the safety protocols, were converted into continuous ones by counting the number of "yes" answers in a set of 18 questions. The objective of this analysis was to evaluate the influence of socio-demographic variables on the correct execution or not of the protocols in a global way and not specifically each conduct. For this analysis, the comparisons performed were tested by Pearson's correlation.

As for the risks, the research brought minimal risks considering that the study was carried out by means of an individual response to the proposed form, where each participant was assigned a numerical code, corresponding to the sequencing of the application of the forms. The act of answering the form could cause some kind of discomfort to the research participant, however, all participants were made aware that they could stop answering the evaluation form at any time.

As for the benefits of the research, the study contributed to enrich scientific knowledge in the area of patient safety in an overcrowded environment, as well as bringing subsidies to nurses, users and managers, providing relevant information as to the importance of their action in promoting patient safety. These benefits should be observed by managers, considering that when safety protocols are effectively performed, there is cost reduction as to the patient's permanence in case of patient safety failure or in cases of adverse events, there is greater credibility of the institution and there is return of the population as to the efficiency of the institution. To the academic community and teaching institutions, the study brings information about the scientific nature that is adopted, which can be used during theoretical classes and used in concomitance with active methodologies.

This study follows Resolution 466/2012 of the National Health Council (NHC), which provides on ethical aspects in research involving human beings, incorporating from the perspective of the individual and collectivities, bioethical references, such as como: autonomy, non-maleficence, beneficence, justice and equity, among others to ensure the rights and duties of research participants, the scientific community and the State (M. da saude Brasil, 2012). All research participants signed the Informed Consent Form. The project was submitted to the Brazil platform and Ethics Committee (CEP) of the Santa Casa de Misericórdia do Pará Foundation (FSCM-PA), and approved under the number of the opinion: 3,364,553.

III. RESULTS

The results were divided into two chapters, the first relating to the characterization of socio-demographic and labor aspects, and the second deals with the basic protocols of patient safety, where it talks about the execution of the basic protocols by nurses, the knowledge of these professionals about the protocols and the correlation of the workload with the execution of the basic protocols of safety.

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The data presented below are the most relevant in the use of statistics in GraphPad Prism 8 and in the application of the Pearson correlation test.

CHARACTERISATION OF SOCIO-DEMOGRAPHIC AND LABOUR ASPECTS

Table 1 infers that there is a significant frequency of female participants 12 (75%) in relation to male participants 4 (25%). The average age among nurses was 45.5 years, with a predominance of age between 40-49 years 9 (56.3%), and most are married 7 (43.8%). There is a predominance of participants in the study who are granted 11 (68.8%), and the remaining 5 (31.3%) work in temporary employment.

It is noted that there is a balance in the length of training for professionals with an average of 18.4 years. It is also shown that all nurses have done at least one post-graduation and that the predominant frequency occurred in the obstetrics area 12 (54.5%), 3 (13.6%) in the neonatology area, and in the areas of Emergency and Emergency, Epidemiological Surveillance, Health Systems Auditing, Oncology, Cardiology, Collective Health and Women and Child Health 1 (4.5%) frequency in each area.

It is inferred that currently 16 (100%) professionals work in the obstetrics area and 11 (68.8%) for more than five years. As for the time spent in hospital, a significant number of nurses 11 (68.8%) have worked in the hospital for more than five years. The average hours worked by nurses are 8.6 hours a day, with half of the professionals working 6 hours 8 (50%), and 4 (25%) working 12 hours.

Table 1: Distribution of the socio-demographic and labor characterization of nurses working in overcrowded units of a Public Hospital in Belém, Pará, Brazil 2018.

Sociodemographic and Labor Profile	**N**	**%**
Gender		
Female	12	75,0
Male	4	25,0
Age Group		
30-39	2	12,5
40-49	9	56,3
50-59	5	31,3
Civil State		
Married	7	43,8
Single	5	31,3
Widower	1	6,3
Divorced	3	18,8
Type of bond		
Contest	11	68,8
Temporary	5	31,3
Training time		
1-9	3	18,8
10-19	6	37,5
20-29	5	31,3
30-39	2	12,5
Working time in the hospital (years)		
1 – 5	5	31,3
5 – 10	11	68,8
Current field of action		
Obstetrics	16	100,0

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Time in the current field of activity (years)		
1 – 5	5	31,3
5 – 10	11	68,8
Working hours (hours)		
6h	8	50,0
8h	3	18,8
12h	4	25,0
18h	1	6,3

Source: Authors' research.

Figure 1 shows a comparison between the execution of the patient's basic safety protocols and the time of graduation in years, showing a weak correlation (r = -0.2257).

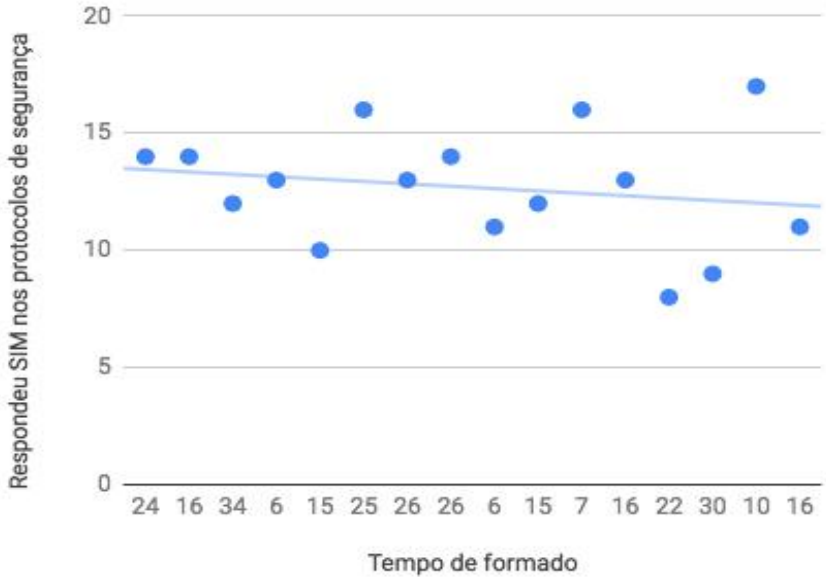

Fig.1: Correlation of YES responses in patient safety protocols with time of training of nurses working in overcrowded units of a Public Hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (tempo de formado = time of graduation)

BASIC PATIENT SAFETY PROTOCOLS

The results regarding the basic protocols for patient safety were organized in three moments: the first one that brings results about the execution of the patient safety protocols; the second one talks about the nurses' knowledge about the patient safety protocols; and the third one that brings evidence about the comparison of the workload with the execution of the basic safety protocols.

Execution of basic patient safety protocols

Regarding the execution of protocols, figure 2 shows the relative frequency of YES (positive responses) and NO (negative responses), 6 (37.5%) nurses answered more than 75% of the form with YES assertives, 9 (56.3%) answered between 50% and 75% of the assertives with positive responses, and 1 (6.25%) participant answered more than 50% of the assertives with NO responses.

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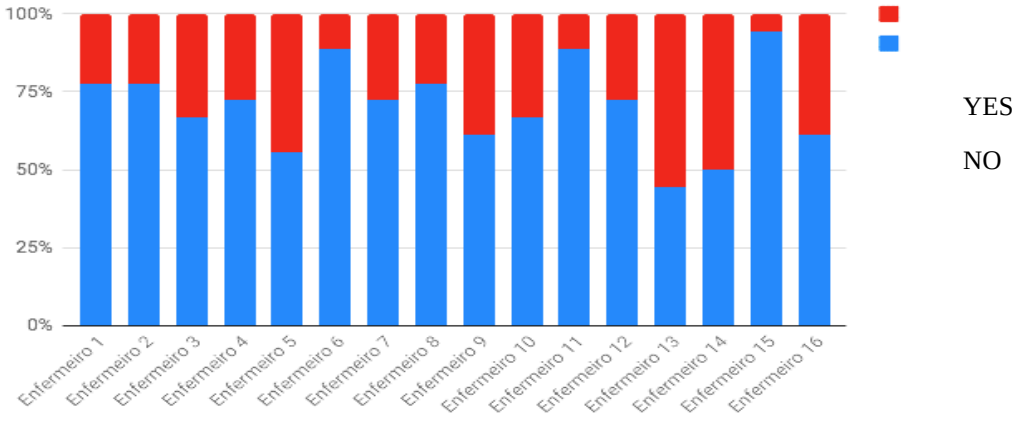

Fig.2: Joint assessment of patient safety protocol execution by nurses working at a Public Hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (Enfermeiro = Nurse)

Figure 3 shows the basic protocol of "hand hygiene practice in health services" identified as "hand hygiene" with a relative frequency of execution of 75%, the basic protocol of "patient identification" identified as "identification" with a relative frequency of execution of 56%, the protocol of "fall prevention" with 75% of execution, the protocol of "pressure injury prevention" with a relative frequency of execution of 63%, and the protocol of "safety in prescription, use and administration of medicines" identified as "medicines" with a relative frequency of execution of 81%.

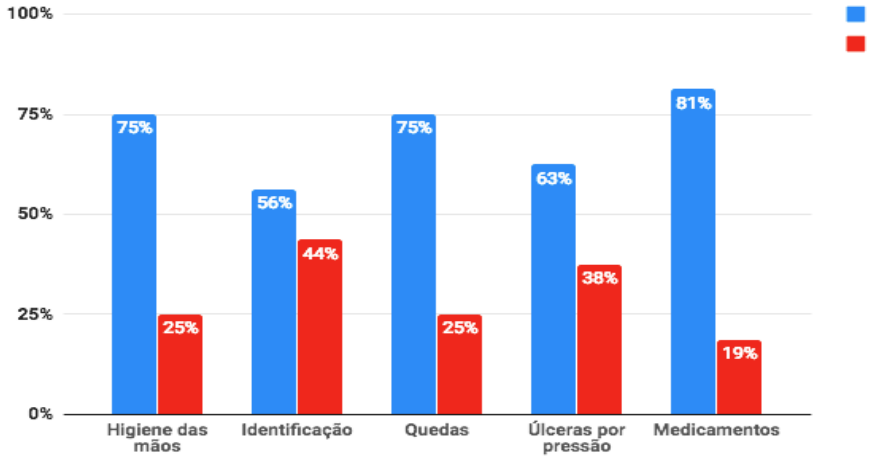

Fig.3: Distribution of the relative frequency of execution of five basic patient safety protocols used in the care by nurses working at a Public Hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (Higiene das mãos = Hand hygiene); (Identificação = Identification); (Quedas = Falls); (Úlceras por pressão = Pressure ulcers); (Medicamentos = Medicines); Blue = YES; Red = NO.

Nurses' knowledge of basic patient safety protocols

In figure 4, after the statistical comparison between the variables, the comparison between the questions of the protocols related to pressure injury and the accomplishment of permanent education, is significantly related to the absence of permanent education on this subject (p = 0.0345).

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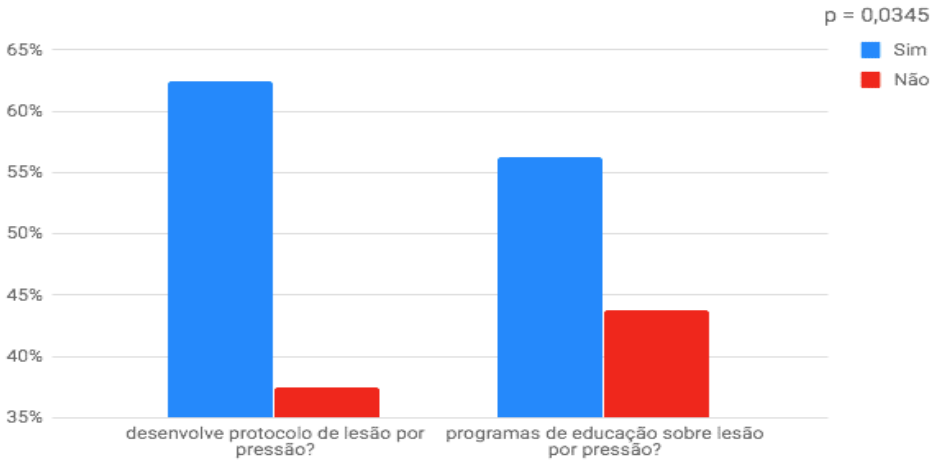

Fig.4: Comparison between performing the pressure injury protocol and continuing education by nurses working in overcrowded units of a Public Hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (Desenvolve protocolo de lesão por pressão = Develops pressure injury protocol); (Programas de educação sobre lesão por pressão = Education programs on pressure injuries); Blue = YES; Red = NO.

Comparison of workload with the execution of basic safety protocols

As for the comparison of the "YES" answers of the questions, with the working hours of the professionals, the dispersion diagram shows a weak negative correlation, that is, the longer the working hours of the nurse, the smaller the number of correct procedures performed (r = -0.3037).

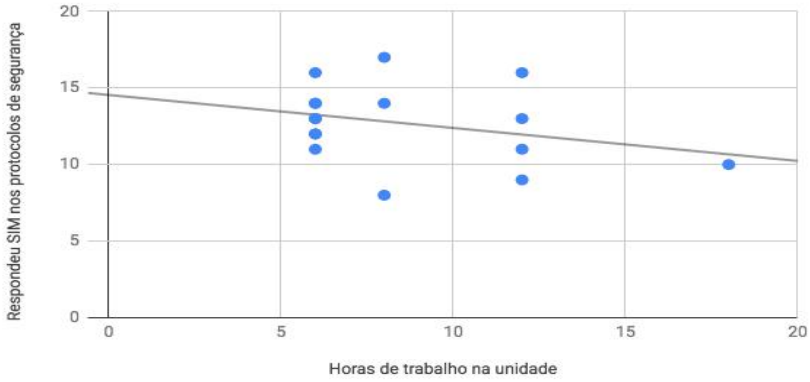

Fig.5: Comparison of the joint evaluation of the form's questions with the working hours of nurses working in overcrowded units at a public hospital in Belém, Pará, Brazil 2018.

Source: Authors' research. (Horas de trabalho na unidade = Hours of work in the unit).

IV. DISCUSSION

CHARACTERISATION OF SOCIO-DEMOGRAPHIC AND LABOUR ASPECTS

In Brazil, women represent 73% of health jobs. Nursing is a profession where the female gender is predominant. It is considered that there is a historical relation between this predominance and care (Carrieri, Diniz, Souza, & Menezes, 2013). It was found that the nurses who attend the patients in the institution studied in the city of Belém/PA are characterized by being mostly female (75%). These data are similar to another study in 2012 in southern Brazil, where the predominance of the female gender was identified in the study (Esser, Mamede, & Mamede, 2012).

Another important aspect evidenced in the results of the research is the correlation of the execution of patient safety protocols with the time of training of nurses, which showed a weak correlation (r = -0.2257), which may indicate that regardless of the time of training, professionals know the recent policy of patient safety, which may be related to continuing education and education. The same indicates a recent study that showed that continuing education provides gradual changes in the complex reality of health services (Campos, Sena, & Silva, 2017).

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BASIC PATIENT SAFETY PROTOCOLS

Execution of basic patient safety protocols

The study showed that the relative frequency of execution performed by nurses presents a similar response, where it can be identified that all basic protocols are performed with a frequency higher than 56% of use, which may indicate a positive aspect related to the performance of the basic protocols by nurses.

The protocol most used by the study nurses is that of "prescription, use and administration of drugs", in the figure identified as "drugs", with a frequency of 81%. This may indicate an adequate level of knowledge regarding the use of this protocol.

A study conducted in 2016 identified similar results to this survey, inferring that drug administration is one of the most important activities in nursing and that knowing the types of errors and causal factors in the occurrence of failure in drug administration is essential for developing preventive measures to reduce them (Costa et al., 2016).

However, it was found that the lower frequency of performance was in the "patient identification" protocol, it is noted that in practice, patient identification is a stage of nursing care that does not receive proper attention, and may interfere with the other stages essential to ensuring the quality and safety of the service provided.

It is worth noting that a 2007 publication by the National Patient Safety Agency (NPSA) of England and Wales highlighted that more than one in ten cases of reported incompatible care were related to the identification bracelet (Hoffmeister & Moura, 2015).

The identification bracelet being an additional resource in combating errors, when used correctly, containing the definition of patterns related to color, material, identifiers and when checked before performing procedures, favors a safe practice in the identification of the patient.

It was identified, according to the joint evaluation of the form questions, considering that the answers "YES" meant that they performed the proper activity, that less than half (37.5%) of the nurses answered positively to more than 75% of the form assertions, being able to identify that 62.6% of the interviewed professionals have a lack of knowledge about the protocols, and probably do not perform basic protocols of patient safety in a complete way, for the realization of a safe assistance and care based on non-maleficence.

Embora estudos brasileiros relacionados a erros e eventos adversos dentro do sistema de saúde não sejam escassos, porém, quando relacionado com os protocolos básicos de segurança do paciente ainda é um desafio para os pesquisadores no cenário nacional. O que poderá propiciar um maior amadurecimento nas organizações de assistência e de formação, induzido pela necessidade de se implantar o Programa Nacional de Segurança do Paciente, que objetiva monitorar e prevenir, em hospitais e outras unidades de saúde, os incidentes causadores de danos na assistência ao usuário (Lopes et al., 2019).

Nurses' knowledge of basic patient safety protocols

The study showed that the professionals responded positively to the assertions of the form, indicating that there is knowledge, and realization of the basic protocols of patient safety.

The research also highlights that the continuing education offered by the institution, along with the continuing education that the professional seeks, are proposals for strategic actions that lead to the understanding that the individual must have in his improvement a goal to be followed throughout his life.

A study conducted by Paschoal, Mantovani, & Lacerda, (2006), brought similar results regarding continuing education, where it is understood as a constant search for learning, as one of the actions that enable the development of this process of change, aiming at the professional qualification of the nurse and consequently the realization of competent, conscious and responsible professional practice. For the nurse, this search for competence, knowledge and updating is essential to ensure the survival of both the professional and the profession itself.

The comparison between the questions of protocols related to pressure injuries, it was verified that the non performance of these procedures, may be related to the lack of permanent education on this subject, inferring that the nursing assistance offered to the care and prevention of pressure injuries are not yet the most adequate.

It is believed that the nursing management team should identify this weakness and seek, together with professionals from other areas involved, methodologies to provide updates on effective care to minimize the occurrences and their severity in patients in this institution.

The same is identified in another study, where it was found that lifelong education benefits the professional at the point where he or she acquires new knowledge, and favours the institution, because the professionals together start to offer quality care by reducing the incidence of errors and contemplates the patient who will receive quality care from nursing (Gonçalves et al., 2013).

Since permanent education is essential for quality assistance, in a study conducted with 14 preceptors of residence, showed that the majority did not receive adequate

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qualification, in relation to extension courses, updating, and felt impaired in relation to preparation for teaching. This shows that since specialization the professional has no contact with continuing education and does not know its benefit in relation to patient safety (Girard, Sardinha, Nascimento, Teixeira, & Borges, 2019).

Workload correlation with the execution of basic safety protocols

The working hours of the professionals, in the dispersion diagram shows a weak negative correlation, that is, the longer the working hours of the nurse, the smaller the number of correct procedures performed (r = -0.3037), which may indicate the occurrence of more adverse events to the patient due to physical and mental exhaustion.

And we can observe in the research that the professionals fulfill an average workload of 43 hours per week, ranging from 30 hours to 90 hours, among them, it was noticed that 50% of the professionals fulfill a workday equal or superior to 40 hours per week.

In a study conducted in the state of São Paulo in 2014, it was found that approximately 78% of the AE in patients were related to complications attributed to the work overload of the nurse (Novaretti, Santos, Quitério, & Daud-Gallotti, 2014). Segundo Araujo et al (2017), the quality of nurse care reflects the quality and safety of patient care.

The same study points out that there may be a relevant association between the nurse's workload and the occurrence of adverse events, such as bed falls and central venous catheter-related infections, demonstrating that, within the hospital environment, the increase in the number of patients assigned to each nurse may increase the incidence of these indicators, having a negative impact on patient safety (Magalhães, Dall'Agnol, & Marck, 2013).

These findings are consistent with results presented by previous studies that suggest that proper sizing of the professional with lower patient/professional rates helps reduce the incidence of adverse events, including bed falls and infections.

It should be noted that the challenges faced by these professionals, related to overcrowding in the health services, possibly include the absence of adequate risk rated reception; lack of qualified professionals; lack of material resources; high waiting time for care; inadequate physical areas; absence of back beds; excessive workload; shortage of human resources and lack of standards and routines. To improve the quality of care, these factors need to be changed (Kolankiewicz et al., 2017; Paixão, Balsanelli, Bohomol, & Neves, 2017).

To solve the problem of overcrowding, a study says that it is necessary to create public health policies aimed at this sector, the implementation of programs and management tools to ensure improvements in the quality of care. In addition to strengthening basic care to effectively solve problems of low complexity, increasing human resources in the health services, which will contribute to the reduction of overcrowding (Santos & Santo, 2014).

The limitation of this study focuses on the small use of a population sample. However, the material found and the analysis made make it possible to identify important competencies for the realization of patient safety, as well as to indicate the possibility of carrying out new studies that improve their development.

V. CONCLUSION

This article concluded that the basic patient safety protocols are being performed in overcrowded environments. Furthermore, that continuous and continuing education can be effective methodologies that allow subjects a process of self-analysis at work, for work and beyond, in order to succeed the knowledge of the nurse in the application of the basic protocols of patient safety, regardless of the time of training of this professional.

The relevance of this study to nursing is highlighted in terms of the nurse's role, since he is the promoter of the patient's safety culture, which should be understood as a device to mediate changes and ensure a safe assistance practice, with the minimum of mistakes.

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