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Perceptions of nursing professionals about the use of patient safety computerization

Percepções dos profissionais de enfermagem acerca do uso da informatização para segurança do paciente

Percepciones de los profesionales de enfermería acerca del uso de la informatización para la seguridad del paciente

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ABSTRACT

Objective: Getting to know the perceptions of nursing professionals about the use of computerization in promoting patient safety.
Methods: Qualitative research performed at a hospital in the southern region of Brazil. Data collection was performed in November 2016, through a sociodemographic questionnaire and recorded interviews, guided by the question: "Tell me about the relationship between computerization and patient safety in this hospital". The transcribed statements were submitted to the thematic content analysis proposed by Bardin.
Results: Among the participants, 21 were nurses and 31 were nursing technicians. From the discourses, the following categories were created, Information Technology Contributions for the promotion of safe care, and Information Technology Fragilities: indirect implications for safe care.
Conclusions: The participants perceived the computerized system as a resource that promoted greater patient safety. However, there is a need to improve the infrastructure and the technical capacity of the team for an efficient use of the system.
Keywords: Patient safety. Information technology. Decision support techniques. Nursing informatics. Quality management.

RESUMO

Objetivo: Conhecer as percepções de profissionais de enfermagem acerca do uso da informatização na promoção da segurança do paciente.
Métodos: Pesquisa qualitativa realizada em hospital da região Sul do Brasil. A coleta de dados foi realizada em novembro de 2016, por meio de questionário sociodemográfico e entrevistas gravadas, norteadas pela questão: "Fale-me da relação entre informatização e segurança do paciente neste hospital". Os depoimentos transcritos foram submetidos à análise de conteúdo temática proposta por Bardin.
Resultados: Dentre os participantes, 21 eram enfermeiros e 31 eram técnicos de enfermagem. Dos discursos, emergiram as categorias Contribuições da Tecnologia da Informação para a promoção de cuidado seguro e Fragilidades da Tecnologia da Informação: implicações indiretas ao cuidado seguro.
Conclusões: Os participantes percebiam o sistema informatizado como recurso que promove mais segurança ao paciente. Contudo, há necessidade de melhorar a infraestrutura e a capacitação técnica da equipe para o manuseio eficaz do sistema.
Palavras-chave: Segurança do paciente. Tecnologia da informação. Técnicas de apoio para a decisão. Informática em enfermagem. Gestão da qualidade.

RESUMEN

Objetivo: Conocer las percepciones de profesionales de enfermería acerca del uso de la informatización en la promoción de la seguridad del paciente.
Métodos: Investigación cualitativa realizada en hospital de la región Sur de Brasil. La recolección de datos fue realizada en noviembre de 2016, por medio de cuestionario sociodemográfico y entrevistas grabadas, orientadas por la cuestión: "Hable de la relación entre informatización y seguridad del paciente en este hospital". Los testimonios transcritos fueron sometidos al análisis de contenido temático propuesto por Bardin.
Resultados: Entre los participantes, 21 eran enfermeros y 31 eran técnicos de enfermería. De los discursos surgieron las categorías Contribuciones de la Tecnología de la Información para la promoción de cuidado seguro y Fragilidades de la Tecnología de la Información: implicaciones indirectas al cuidado seguro.
Conclusiones: Los participantes percibían el sistema informatizado como recurso que promueve más seguridad al paciente. Sin embargo, es necesario mejorar la infraestructura y la capacitación técnica del equipo para el manejo eficaz del sistema.
Palabras clave: Seguridad del paciente. Tecnología de la información. Técnicas de apoyo para la decisión. Informática aplicada a la enfermería. Gestión de la calidad.

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INTRODUCTION

Computerized systems, when applied to health, offer different resources that, coupled with the management of care, enable the implementation of additional barriers to prevent adverse events. In recent years, systematized programs are being developed for the collection and analysis of information, offering support to the planning of interventions and management of the plan of care[1]. In addition, the technological resources enable bedside monitoring actions and the bundles, which are warning systems to support decision-making, in addition to instruments which produce warning signs and computerized checklists[2]. Thus, computer programs are recognized as important factors in the promotion of patient safety and in the qualification of the assistance provided.

The increasing incorporation of technology in institutions and services occurs due to the pursuit of quality in health, since this dimension is cited as a mechanism to promote sustainability in the use of resources, and to promote the culture of safe care, because the risk linked to the health assistance environment is undeniable, and is sustained by numerous studies[3]. In this context, the safety of the patient — as a dimension of quality —, is understood as the maximum reduction of risks associated with the care, with a rational use of strategies planned for this purpose[3].

Internationally, since 2004, from the discussions promoted by the World Alliance for Patient Safety, strategies related to patient safety are defined for the promotion of good care practices[3]. However, although the efforts on behalf of safe care are numerous, the number of patients who are harmed during health care processes is still significant. A study revealed that errors in care are the third leading cause of death in the United States, and that in the United Kingdom, on average, one incident with damage to the patient is reported every 35 seconds[4]. Such findings indicate that, currently, the most important challenge in the field of patient safety is the prevention of harm to the patient, mainly the preventable harm, through all the assistance provided[4]. Thus, it is important for each country to adopt strategies for the implementation of safe practices and risk control.

With the goal of achieving better indexes of quality of care, with a focus on the promotion of patient safety and user satisfaction of health services, Brazil instituted the National Policy for Patient Safety (PNSP) in 2013. The policy seeks to encourage health services to adopt organizational tactics for a qualified assistance[5]. Thus, strategies of promotion of safe care, such as, for example, the goals of patient safety, must be implemented using the most critical scientific knowledge as possible, aiming at an evidence-based practice[3].

It is important to note that, for the implementation and management of strategies for safe-care, it is also necessary to use and manage human, financial, material and technological resources[5]. Specifically on the issue of technology resources, the Resolution of the Board of Directors (RDC) 63/2011, issued on November 25, 2011, encourages the structuring of the information technology (IT) for the promotion of safety and quality of care. IT consists of instruments and technological resources for the administration or storage of information, commonly represented by software, hardware and the Internet[6].

In the case of the interrelationship between IT and nursing, this is seen as a breakthrough for computerization in health, because in the context of the hospital, nurses are the professional category with the largest contingent of the workforce[1], and they assume an important role in the quality of patient care. Thus, to perform information management through a computerized system, the nurse has access to technological resources that also promotes the management of care[7], because these resources assist the nurse in making assertive decisions related to the planning of the assistance, and this tends to improve the quality of care provided[1].

Although the literature portrays positive results of the use of technological resources in the process of care in health, it is known that the nursing professional must take ownership of even more of the technologies available for health care, from the creation of the software created for the field to its use in favor of a better care[8]. In addition, gaps in knowledge can be observed regarding the relationship between computerization and the work of nurses, as well as on the applicability of the technological resources[9]. In this context, it is necessary to investigate the implications of the use of technologies in the promotion of safe care, from the perspective of nursing professionals.

Thus, it has been hypothesized that investigating about the triad of patient safety, information technology, and nursing is important because these findings may contribute to the planning of strategies and management in favor of the implementation and maintenance of a culture of safety in health institutions. Furthermore, the results can contribute to the identification of mechanisms that promote greater adaptability of the IT to the work done by nursing professionals, and the development of best practices in health.

Considering the above, this study is based on the following question: How do professionals of the nursing team perceive the relationship between the use of computerized system and the facilitation of a safe care? To answer

this question, this study aimed to know the perceptions of nursing professionals on the use of computers for the promotion of patient safety.

METHODOLOGY FRAMEWORK

This article originated from the dissertation entitled "Computerization and patient safety: perceptions of nursing professionals from a public hospital", presented to the Postgraduate Program in Nursing of the State University of Maringá[10]. This is a descriptive and exploratory study, with a qualitative approach, executed in November 2016, with nursing professionals working in inpatient units of a public hospital in the South region of Brazil, which uses a computerized system in its work dynamics.

This institution is a medium-sized hospital, with 4,600 hospital admissions/year, being a reference for outpatient and inpatient medium complexity care for the health of adults and, especially, of the elderly population. This hospital is composed of 134 hospital beds, and eight healthcare units (four units of hospitalization, ICU type II, emergency room, Surgical Center, and Outpatient care), and its four hospitalization units were selected for this study. Among the four hospitalization units, three are for medical clinic patients and one to surgical clinic patients. Among the units of the medical clinic, one, in particular, had electronic "bedside" checking of medication administration.

The institution was chosen as the location of the study because it has a consolidated hospital management system that is applicable to the promotion of care. Their main resource is the electronic patient record (digital version EMR), which is used by the multiprofessional team. Such institutional maturity is evidenced by the fact that the institution received the level 6 certification from the Healthcare Information and Management Systems Society (HIMSS), a global non-profit organization with the goal of improving health trough IT[11]. It stands out that this is the first public hospital in Brazil that has earned such a title.

For data collection, an inclusion criteria was determined: participants needed to have been professional nurses in inpatient units of the institution of the study for at least a year. The time since they started working there was considered to guarantee that the participants had ample contact with the IT systems in their work and, thus, were able to easily recognize its implications on patient safety. The exclusion criteria included temp workers, and those that were in holidays/license or were covering the shift of other workers during the period of data collection.

Through the formal acceptance to participate in this study, represented by the reading and signing of the Free and Informed Consent Form (TFIC), each participant was asked to fill out a form with objective questions about their sociodemographic and labor characteristics. Subsequently, the semi-structured interviews were performed in the institution itself, in a private place, during the working hours of the professionals. It is worth noting that the interviews were conducted individually, according to the availability of each participant, to intervene as little as possible in the health care process.

The interviews were recorded through an audio device, without setting a time to end, and led by the guiding question: "Tell me about the relationship between computerization and the safety of patients in this hospital." In cases where the participant had difficulty answering or expressing themselves, the researcher added the following support question: "Does the computerization have influences on your work? Tell me about that"; "Talk to me about the influence of computerization on patient safety in this hospital".

The interviews were finished when information saturation was reached and the researcher achieved the objective, represented by the repetition of content in the speeches. At the end of data collection, 52 nursing professionals, 21 nurses and 31 nursing technicians had been addressed.

The content recorded in the interviews was transcribed in its entirety, using the software Microsoft Office Word 2010. After the statements were printed, an analysis of content in the thematic modality was executed, through the following steps: pre-analysis; exploration of the material (codification); and the treatment of data (inference and interpretation)[12].

In the presentation of the results, are shown, in brackets, terms to facilitate the apprehension of the content of the speeches by the reader, without changing their meaning. In addition, to maintain the confidentiality of the participants, the interviewees were coded with the letter "E", the initial of "Entrevistado" (interviewee in Portuguese), followed by an Arabic numeral referring to the sequence of the interviews.

All ethical principles established by resolution 466/2012 of the National Health Council were complied with, and this study is registered under CAAE N. 55921216.0.0000.0104 and protocol N. 1.605.382, issued by the Standing Committee on Ethics in Research Involving Humans from the State University of Maringá (UEM – PR).

RESULTS AND DISCUSSION

52 professional nurses who worked in inpatient units participated in the study. From these, one was the nurse coordinator of the unit; four were nurses supervisors; 16

clinical nurses; and 36 nursing technicians. Most were females (n=48; 92%) and married (n=26; 50%). Their age ranged from 24 to 62 years, and 22 participants (42%) were 40 years-old or older. The minimum time of work in the institution was one year, and the maximum, five years. Among the nurses, eight were specialists, and all nursing technicians had graduated from high school, although four of them had finished nursing school or were undergraduate students in nursing.

Two thematic categories emerged from the statements: (1) Information Technology Contributions emerged for the promotion of safe care, and (2) Fragilities in Information Technology: indirect implications for safe care.

Information Technology Contributions emerged for the promotion of safe care

Participants reported that the main contribution of the use of a computerized system for the promotion of safe care was regarding the administration of medications:

> *[...] if it is a medication that is not prescribed, we can't check it. (E19)*

> *[...] we use the warnings, both for allergies and for medication. For example, if the medication is delayed, or if it is not for that patient [...] (E32).*

> *[...] the checking at the bedside is done through the bar code. When you click on the bar code [set up on the wristband identification], you have all the information of the patient, [...], if it is really that patient and if it is that medication (E1).*

The security in the administration of medications is mentioned as one of the major benefits of the computerized system, because it provides information that will assist in the performance of correct procedures, generating legitimacy and a sense of security in the execution of care. This fact is important because, as stated in the literature, the main errors related to nursing care occur during the administration of medications[13]. This is a very complex issue, because it generates risks of adverse events, with impact on the clinical evolution of the patient.

The implications to patient safety are relevant to justify the use of resources, such as, for example, the computerized system, which will minimize the chance of errors in the process, since they impact directly in the prevention of damage to the patient. This is because, when linking information about the patient's identification, prescription, and the drug tracking, the system finds congruences between these data[14], enabling the correct execution and checking of the medical prescription.

Specifically, bedside checking, as mentioned by E1, allows the information to be verified next to the patient, also using another barrier mechanism, in this case, the identification wristband. Considering this, information technology stands out as the mechanism that enables double checking, through the checking of the bar code, present on the wristband of the patient, and, also, of the bar code of the medication to be administered[15].

In the advanced processes of best practices, the computerized system makes it possible to triple check, through the addition of the identification of the professional who performs the procedure. Thus, the technology not only enables a better tracking of the professionals involved in the process, but also of the actions developed for the patient during drug administration[15].

In addition to the pharmacological management of the hospitalized patient and correct checking of the prescriptions, communication was another relevant aspect mentioned by the participants about patient safety, as the following speeches show:

> *[...] I can open it [the computerized system] and have access to the entire medical record[...] if the patient was discharged or not, when he returns [...] I don't need to go after exams or other systems (E19).*

> *[...]when accessing the system, you can see the information of the Reception: "patient needs wheelchair". Then, you will not put him in the last bed [of the ward], you will put him in the first bed to avoid falling (E5).*

The control and access to all care and procedures through the computerized system are easily available features, because of the convenience of visualizing patient information and all actions related to the care provided. This statement is consistent with the statement of E19, which emphasizes the ease of access to different data relevant to the care provided, through a single tool, which optimizes time and processes. However, the use of a computer and/or portable device, connected to the data network, is required[16]. This same network should allow all data to be shared, without the need to handle large volumes of printed material, which sometimes is disorganized and incomplete.

According to the following statements, still in the context of communication, participants felt that the computerized system enables a better exchange of information

between the different areas, considering that those records can be accessed on a single screen of the software and are easy to understand:

> *[...] when I access the system, all information from the physician, the nurse, the psychologist appears [...] I'll know all about the patient and that's safety (E2).*

> *[the record] becomes clearer when it is handwritten, it becomes more difficult to understand [the prescription]. On the computer, it becomes easier to understand [...] (E48).*

> *They [the IT staff] elaborate a standard text for the professional, with the objective of standardizing the, so there is no conflict of information (E42).*

When considering the statements showed, it can be observed that the IT was highlighted as an important means of communication for the multidisciplinary team. This data is consistent with the literature that indicates computerized systems as resources that assist in the sharing of data and in minimizing misunderstandings generated by inappropriate spelling and/or erasures[13,17].

Considering that the electronic patient record centralizes all of the inputted and structured information about the assistance, the statement expressed by E2 confirms the computerized system as a guiding mechanism for nursing, by assisting the professional to detect possibilities of exposing the patient to risks and to support the decision-making process. The support to decision-making, available when using IT, is in the analyses it provides on the different determinants to a situation of risk (for example, pressure injuries), and, from these actions, presents the professional with actions that can be adopted, according to protocols and guidelines set and/or interfaced with in the computerized system[18]. Thus, the technological resources may send signals to the nurses, which are indicated for the prevention of adverse events and/or clinical deterioration of the patient.

Just like the best information flow between the members of the multidisciplinary team, the availability of access to data, in a quick and structured way, was also mentioned as a means to help the professional to adopt best practices to promote patient safety.

> *[...] sometimes I'll go to the patient and see their vital signs, if there is any change, then I check in the system and I see all vital signs from the beginning and I think, 'no, [his picture] it is not changing', it is ok! Or not, it's getting worse, I must intervene according to the protocol of the institution. (E2).*

When a risk situation is identified, the system signals to the professional which actions are indicated, in accordance with the established guidelines. In accordance with the above, concerning decision-making, literature[19] shows that computerization is seen as a tool to aid the professional to adopt actions according to the internal protocols of the institution and/or regulatory bodies. In this scope, it can be inferred that, perhaps, the greatest finding of this research is that through the incorporation of care into a technological world, more assertive decisions can be made, reiterating that nurses need to base their practice on the resources available to assistance, in order to reduce empiricism in the process of care.

Although the computerized system provides a range of ways to make the promotion of safe care easier, the participants also listed the weak points in using the system.

Fragilities in Information Technology: indirect implications for safe care

The participants noted that the lack of technical training, when inserting a new employee in the institution, as well as their lack of commitment, could have a negative influence on the use of the computerized resources.

> *[...] it is necessary to be trained in the begging for people who become professionals of the hospital and start working with it [the system]. It is also necessary to give time for the person to adapt (E16).*

> *[...] lacks integration so that he [the professional] understand that it [IT] is important. Now they have bad habits, they already know that you can copy and paste, and that it will not result in anything. A hard, serious and full training is necessary, about the importance of the system, about the electronic record for the safety (E45).*

> *[...] the system has many functions that are important but to master them it is necessary time and help from people who understand it [the IT sector] (E27).*

The statements indicate that there is still need for training to better take control of the tool. This is extremely important for the data to be correctly informed and for computerization to be embedded in the work processes. This, even if in an indirect context, results in greater safety to the patient in the hospital.

About the correct insertion of data through the use of the IT, and thus obtaining the best results in quality of care, it is pertinent to highlight the need for the professional to

be prepared and aware about the importance of entering the data in a reliable and appropriate way[1].

A study in Finland analyzed the security incidents related to electronic records, and the main causes of errors identified by the researchers were the problems concerning the man-machine relationship, a consequence of the difficulty of handling and adapting to the computerized resources and equipment (hardware)[19]. Furthermore, the permanent training of the nursing staff linked to the their participation in the discussions inherent to the incorporation of IT in the practice of nursing was considered to be a strategy that is relevant and pertinent in response to the issues observed in that study[19].

In regard to the use of Information and Communication Technology (ICT) in Brazilian healthcare, the report "ICT Health 2015 — Research on the use of Information and Communication Technologies in Brazilian health establishments", showed that 90% of the nurses participating in the study, indicated the lack of training as one of the main obstacles to better use the computerized resources[6]. To decrease this distance between nursing and informatics, literature already presents initiatives on addressing computerization in nursing education courses, namely, promoting the appropriation of the tool since graduation[7].

The improvement in the use of the tool, specifically in cases in which the goal is to promote the safety of the patient, should not be restricted only to prepare the professional technically to handle the resource. It is pertinent for the nurse, as the team leader, to encourage the adhesion to the computerized resources and its insertion in the implantation and management of technological resources, to take maximum advantage possible of all benefits that the system adds to the safety of the patient[1]. No less important, since computerization may be consolidated in the dynamics of health care for most of Brazilian healthcare, nurses need to use means and management techniques linked to this new tool with care, through supervision and ongoing education.

In addition to the lack of adherence of the professional to correctly insert in the system data related to the patient and the assistance provided, not having the computerized tool always available for use was also cited as a fragility of the computerized features, according to the statements bellow:

> *[...] when the system crashes, you have to go back to what you did before [handwritten], and this causes inconveniences and delays. [...] many people using the system results in delays because you need to wait to use it [a computer]. [...] when the system crashes or there is a lack of energy [electrical], it is difficult to perform all the activities (E2).*

> *[...] sometimes we have few computers. [...] the doctor prescribes the medication and don't tell us, we get to see it [the prescription] only at the end of the afternoon, when we notice that there isn't a prescription printed (E21).*

> *[...] when you have an update and the system stops, we have our hands tied. And sometimes the update changes a few things that were not expected (E31).*

For the participants, having the data network available with up-to-date information on care activities was important in order to act promptly and safely. In relation to the available infrastructure, the report "ICT Health 2015" showed that 83% of nurses reported lack of sufficient equipment as a fragility in the access to the computerized system[6]. This result indicates the need to provide equipment and an appropriate financial resources for the better use of the technological tool and the optimization of assistance processes[6]. That is considered to be relevant for the health institutions because as soon as the infrastructure for the development of informatization exists, it becomes consolidated. A study conducted in the United States has identified that among 100 investigations conducted on incidents related to electronic records in health, 67 showed that the computational infrastructure (hardware and software) used to provide support and operationalize applications and medical devices was considered as unsafe or presented technology failures (locking and/or a lack of control on data access, incompatibility of information and errors arising from the update of the system and failures in settings). In addition, in nine other investigations of the same study, the infrastructure was recognized as a contributing factor to an unsafe or inappropriate use of technology, because of configuration errors that lead to the inappropriate access to information[20].

The same study identified, as a strategy for negotiation of the infrastructure problems, the following actions: on-going assessments (monitoring and scope measurement) of the infrastructure used, as well as systematic actions that involve professionals, institutions and policies, for example, to define workflows to carry out implantation tests, to analyze the information that is made available by the systems and to structure alternatives of contingency for access to the data (backup)[20].

In the present study, the infrastructure is perceived by the participants as a problem to be solved, and they reported that the lack of equipment is a limitation in the work

environment. As a measure to minimize this problem, it is suggested that the health institutions, allied to public policies, define regulations that ensure the acquisition and the systematic use of IT in the health area.

FINAL CONSIDERATIONS

The results indicate that nurses perceive the computerized system as one that enables agility in data management and prevents the patient's exposure to unnecessary risk. This is because, according to them, IT favors the safe care through the optimization of the checking of prescriptions, enabling safety barriers in the use of drugs and favoring the communication of data. Despite this, some shortcomings of the system can impact on patient safety, like: the possible unavailability of the computerized system, the need for technical training of human resources and the lack of adherence to the use of IT by some professionals.

In short, the participants in this study positioned themselves in two different ways regarding the use of computers for patient safety, but the benefits attributed to it seem to overcome the difficulties. From this perspective, these findings are expected to contribute to the planning of strategies/policies of integration of computerized technologies in health services, aiming at the improvement of the health care process. In addition, this study can also contribute to guide health services about the incorporation of IT in the practice of safe care, since, possibly, adaptations of the computerized system may be (re) designed to increase the applicability of the technology to the process of care, especially in regard to the admission and training of human resources and development of measures that reduce the unavailability of the system for the nursing staff.

About the implications in the education field, it has been recognized that information technology must be contextualized alongside the professionals since their education, considering that in some institutions this feature is already identified as a work tool, and, consequently, a component that contributes to the qualification of the care. Thus, this study can contribute to raise the awareness of managers of health and educational institutions on the need to address, during the process of formation and/or permanent education, topics focused on the insertion of technologies in health care, and the relevance of the use of these resources in the promotion of care.

In the research field, this study suggests conducting further works on the perceptions of managers and patients about the use of IT in health care, considering that the managers assume an important role in the implementation of strategies for the improvement of care, and the patient is the end customer with whom the tool is used. In addition, it is relevant to investigate the implications of this technology for the prevention and/or for the occurrence of adverse events to patients, aiming to identify potentials and limitations of the computerized resource.

Continuing the discussion about the results found, the population of this study it stands out as its limiting factor, since it was restricted to the nursing staff working in inpatient units. When you consider that in Intensive care Units and Emergency Services the care is of greater complexity and the exposure to risk can be higher, and therefore, it can be understood that the workers involved in these sectors experience other professional experiences in service (ex. warning signs of clinical deterioration identified through the medical-hospital/computerized system interface equipment) and, consequently, can present distinct perceptions about the use of IT to perform the care.

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