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RESEARCH

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FACTORS CONTRIBUTING TO THE INCIDENT OCCURRENCE OF SECURITY RELATED TO DRUG USE IN INTENSIVE CARE

Fatores que contribuem para a ocorrência de incidentes relacionados à terapia medicamentosa em terapia intensiva

Factores que contribuyen a la ocurrencia de incidentes de seguridad relacionados al uso de medicamentos en terapia intensiva

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ABSTRACT

Objective: To identify the factors which contribute to the occurrence of security incidents related to medication therapy in intensive care. **Methods:** Descriptive and exploratory research with a qualitative approach carried out at a hospital in southern Brazil. Participants were fifteen nursing staff. Data collection took place between February and March 2014, through semi-structured interviews, and the data were analyzed using content analysis. **Results:** The data were grouped into two categories: Security incidents related to the institutional / organizational factors, which highlights aspects related to the organization and work process, and security

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incidents related to human factors, pointing aspects related to nursing care. **Conclusion:** Various institutional / organizational and human factors contribute to the occurrence of security incidents related to drug therapy and should both the worker as well the institutions, implement strategies to minimize such events.

Descriptors: Nursing; Medication errors; Patient Safety; Intensive care units.

RESUMO

Objetivo: Identificar os fatores que contribuem para a ocorrência de incidentes relacionados à terapia medicamentosa em terapia intensiva, sob a ótica dos trabalhadores de enfermagem. **Métodos:** Pesquisa descritivo-exploratória, com abordagem qualitativa realizada em um hospital do Sul do Brasil. Os participantes foram quinze trabalhadores de enfermagem. A coleta de dados ocorreu entre fevereiro e março de 2014, por meio de entrevista semiestruturada, sendo os dados analisados por meio de Análise de Conteúdo. **Resultados:** Os dados foram agrupados em duas categorias: Incidentes de segurança relacionados aos fatores institucionais/ organizacionais, que evidencia aspectos ligados à organização e processo de trabalho e, Incidentes de segurança relacionados aos fatores humanos, apontando aspectos relativos a assistência de enfermagem. **Conclusão**: Vários fatores institucionais/organizacionais e humanos contribuem para a ocorrência de incidentes de segurança relacionados à terapia medicamentosa, devendo, tanto os trabalhador quanto as instituições, implementar estratégias para minimizar tais eventos.

Descritores: Enfermagem; Erros de Medicação; Segurança do Paciente; Unidades de Terapia Intensiva.

RESUMEN

Objetivo: Identificar los factores que interfieren en la ocurrencia de incidentes de seguridad relacionados a la terapia medicamentosa en terapia intensiva. **Métodos:** Estudios descriptivo y exploratorio, con enfoque cualitativo realizado en un hospital del Sul de Brasil. Los participantes fueron quince trabajadores de enfermería. La recolección de datos se realizó entre febrero y marzo de 2014, por medio de entrevistas semiestructurada, siendo los datos analizados por medio de Análisis de Contenido. **Resultados:** Los datos fueron agrupados en dos categorías: Incidentes de seguridad relacionados a los factores institucionales / organizacionales, que muestra aspectos relacionados a la organización y proceso de trabajo e, Incidentes de seguridad relacionados a los factores humanos, apuntando aspectos relativos a la asistencia de enfermería. **Conclusion**: Varios factores institucionales / organizacionales y humanos contribuyen para la ocurrencia de incidentes de seguridad relacionados a la administración de medicamentos, debiendo, tanto los trabajadores como las instituciones, implementar estrategias para minimizar tales eventos.

Descriptores: Enfermería; Errores de medicación; Seguridad de los pacientes; Unidades de cuidados intensivos.

INTRODUCTION

Patient safety has been a cross-cutting theme in the relationships among researchers, health professionals, managers, patients, and family members.[1] This is due to health care-related incidents in health facilities, especially in hospitals and primary care units. In this respect, the complexity inherent to the care process depends on several aspects, which can sometimes result in harm to patients.

Given this framework, health care-related incidents stem from a combination of several factors, including systemic failures (for example resource availability), policies, organizational procedures, and human factors.[2] Among the contributing factors in the occurrence of health care-related errors, those related to the institutional, human, and environmental organization are highlighted.[2] Therefore, it is important to identify these incidents and report them to qualify care and satisfy the health care workers' needs.[3]

Failures, equipment maintenance, materials, and management are also highlighted among the institutional/ organizational factors. Human factors include skills/ knowledge as well as psychological and physiological aspects. Environmental factors include aspects related to noise, agitation, and visual stimuli.[4] In Brazil, the National Health Surveillance Agency also include patient factors, which are related to the severity of the clinical condition or lack of adherence to treatment, and external factors, which are usually associated with lack of resources.[3]

The analysis of the cause of an incident should be carried out by focusing not only on workers but also on the mechanisms of errors, contributing factors, and system flaws that can be improved.[5] Health care organizations need to adopt measures aimed at systematically monitoring errors and barriers to minimize its effects, aiming at protecting patients.[6]

Patient safety in intensive care depends on several aspects. Nurses can contribute to the formulation of strategies and implementation of actions in order to minimize risks, prevent incidents, and ensure safe care. So, this is not only an objective to be achieved by professionals but also a professional commitment, including the area of service management. Nursing care-related risks have been widely discussed in the literature, emphasizing the importance of knowing how they are perceived and evaluated by professionals delivering patient care.[7]

Therefore, the organizational structure of a health facility, workers' fatigue and stress, workload, organization of the work process, distraction, communication failure, lack of knowledge about medications, lack of protocols for preparing medications, and failure in storage and distribution of medications may interfere with the safe administration of medications.[8]

Bearing the aforementioned in mind, the following guiding question was formulated: "what are the contributing factors in incidents related to drug therapy in intensive care units according to nursing professionals?" Hence, this study meant to identify the contributing factors in incidents related to drug therapy in intensive care units according to nursing professionals.

METHODS

It is a descriptive-exploratory study with a qualitative approach, which was undertaken in an adult intensive care unit of a hospital located in the South Region of Brazil. Participants were four registered nurses and 11 nurse technicians. Inclusion criteria were as follows: registered

nurses, nurse technicians, and working in the adult intensive care unit for six months. Nurses and nurse technicians on leave were excluded.

Data collection took place over the period from February to March 2014 through semi-structured interviews. Each interview comprised two parts: one for collecting socio-demographic data and another in which the subject was encouraged to report their perceptions of incidents occurring while medications are administered in the intensive care unit. The interviews were scheduled, carried out in a private room in the hospital, and recorded. Furthermore, all participants were off duty during the interviews.

The number of interviewees was determined by means of subjects' adherence to the study and data saturation.[9] The participants were identified by using the letter "I" (interviewee), followed by a number referring to the random sequence of the interviews (such as I1, I2, and I3). Thematic Analysis was used to interpret and analyze the data obtained.[10] The study complied with all the ethical norms for research involving human beings[11] and was approved by the Research Ethics Committee, under the *Certificado de Apresentação para Apreciação Ética* (CAAE) [Certificate of Presentation for Ethical Appraisal] No. 26417113.2.0000.5346.

RESULTS AND DISCUSSION

According to characterization data, all of the participants were females within the age group from 24 to 45 years old, with one to 14 years of professional experience as a nursing professional. Seven interviewees worked day shifts and the others worked night shifts, making a total of 36 hours per week. Eight participants reported having another job. Participant data allowed the rise of two thematic categories: "Safety incidents related to institutional/organizational factors" and "Safety incidents related to human factors".

Safety incidents related to institutional/ organizational factors

The interviewees highlighted a series of institutional/ organizational factors that may influence the occurrence of incidents: work routine, patients' complex medical records, fragmentation of care, physical structure, and the number of nursing staff members. Work routine deserves to be highlighted, as can be seen in the following statements:

> *"By the time I come, I get to work right away. I begin to work at the nursing station, then I assign each employee to care for a different patient. The nurse technicians check the patient's vital signs and I do a physical exam on him/ her and check his/her progress. I take the opportunity to check the CVP [central venous pressure] and the medicines the patient are taking. If I spot any other change I talk to the doctor. After that, I write the nursing prescription. Then I check whether there are intercurrences, dressings, tests to be performed, and probe passages. At bath time, I take the opportunity to check whether the patient has any injury, drains, and dressings".* (I4)

> *"By the time we come, we change clothes, wash our hands, get to check the patient's vital signs, see whether he/she is intubated, and check the cuff, his/her pupils, and abdomen. Then we check the patient's progress [through the nursing record], prepare, and administer the medication. Then, we replace the patients' medication cups, help them with the meal, and bathe them. Then, the doctor evaluates the patients. He/she always prescribes more medications. Then we have to perform suctioning, change the decubitus position, oral hygiene, laces, probe attachment, and follow the routine".* (I14)

The study participants reported being concerned about the care delivered to patients. The fact that they sometimes need to care for two or three patients was highlighted, which makes them use strategies to allow them to perform the activities in the best possible way. Another issue that draws attention is how the activities are assigned to nurse technicians, which indicates that the care process is fragmented. However, participants did not perceive this fragmentation as something that may compromise the quality of care.

This situation is quite common in hospitals as it is not standardized. Although the *Conselhos Regionais de Enfermagem* (CORENs) [Regional Nursing Councils], during inspection visits, recommend that professionals provide full care in order to strengthen the link among workers, patients, and family members, promote the humanization of care, and qualify nursing care.

One conduct adopted in the health services is to assign each nurse technician to care for a different patient. These workers are responsible for caring for the patients under their responsibility. In this respect, they are responsible for delivering integral nursing care, which includes the following procedures: hygiene, vital signs monitoring, medication administration, decubitus change, airway suctioning, and application of dressings. These procedures should be performed always under the guidance and supervision of a nurse.

Achieving completeness of care is a great challenge because it requires numerous skills. Intensive care is an environment where workers hold constant expectations regarding the patient's clinical condition, which requires that they acquire specific skills and competences. The fusion of scientific, technical knowledge and technological expertise contributes to a safe and better-quality care.[12]

Critically ill patients are admitted to intensive care units, which demands that health care workers act with promptness and agility and have a vast knowledge of different pathologies.

> *"We can't fulfill all the demands. Most of the time it's very tough. You have to care for an obese, intubated patient with a drain, change the decubitus position, and administer medications using an infusion pump with care".* (I11)

"I think there's equipment shortage. Sometimes a respirator doesn't work [...] more beds should be available because the bed center keeps calling and we can't receive patients from neighboring cities sometimes". (I12)

"[...] there has even been patient turnover recently because patients in better conditions have been discharged so that those in more serious conditions can receive treatment [...] there has been a lot of patient turnover. One patient is discharged in order to another one receive treatment". (I13)

The workers understood that the workload experienced was associated with a lack of equipment and patient turnover. They also perceived that the low number of beds implies a higher patient turnover. According to them, patients still in need of intensive care were being discharged.

It is understood that the more serious the patient's condition, the greater the number of therapeutic interventions required and, consequently, the longer the time required by the nursing staff to provide care. Thus, managers should understand that it is necessary to provide units with sufficient health care workers equipped with skills. In addition, it is important to have sufficient quality materials, drugs, and equipment to fulfill the daily demands.

Another aspect highlighted by one of the interviewees was the physical structure of the unit, viewed as a factor that needs to be rethought in order to facilitate work and improve the quality of care.

"[...] We work for six hours. We work a lot inside the unit. We have already decided on this. The nurse technicians stand with their backs to the patient at the time of preparation and dilution of medications because the nursing station is far away. We know that medications should have to be prepared at the bedside, but we are thinking, and this has been discussed for a long time". (I12)

The layout of the beds in the unit is structured in a format resembling an "L". There is an "island" at the center of this structure. Currently, this site is used for workers to change shifts and receive records in general. Medications are prepared and diluted in another environment far from the patients, where the employees have their backs to them. There was concern about this issue among the interviewees since this may contribute to the occurrence of incidents, especially involving medication use.

It is also evident that there was a low number of nursing professionals within the institution. The study participants stated that sometimes they needed to care for several patients at the same time.

"Sometimes we have to take care of three or four patients. It is very tiring and stressful. There was a time that we stayed in when we had only three nurse technicians for ten beds". (I3)

"One nurse for ten beds is manageable. But for nurse technicians, it's very tough. They end up leaving a lot to be desired. In cases of cardiac arrest, I need three people, and one employee remains available for all the other beds". (I15)

It is perceived that this situation generates physical and emotional exhaustion, compromising the quality of care. According to the Resolution of the Federal Nursing Council No. 293/2004, the minimum number of hours of intensive care corresponds to 17.9 hours per patient, and the percentage of nursing professionals (nurses and nurse technicians) should be in the range of 52-56%.[13]

"Ten patients for one nurse is very tiring. Some days I get out of here exhausted, and almost every day a nurse technician has to take care of three patients". (I12)

According to the Resolution of the Collegiate Board of Directors from the *Agência Nacional de Vigilância Sanitária* (ANVISA) [Brazilian Health Regulatory Agency] No. 7/2010, February 24th, 2010, at least one nurse technician is required for every two intensive care beds in each shift.[14] A study conducted in an intensive care unit revealed that the average time of nursing care was 29.5 hours, of which 27.4 hours were spent delivering direct care and 2.1 hours in indirect care per patient/day.[15] Concerning the number of nurses in the same unit, the Resolution No. 26, May 11th, 2012, states that there should be at least one nurse for every 10 beds or fraction of them in each work shift.[16]

Nonetheless, even in the face of a shortage of nursing professionals, they seek strategies to deliver more effective care and feel responsible for their duties since the improvement of the patient's clinical condition also depends on their effort, dedication, and competence. Another important aspect was related to feelings of impotence, shame, fear of being labeled as negligent, fear of retaliation, fear of losing the job, among others.

"I was very afraid that something more serious would happen to the patient. I was also afraid that I would lose my job because we have a son, a house, and those mistakes are very serious". (I7)

"If I do something wrong or fail in applying the dressings I may be warned, or even be fired [emotion]". (I10)

Given the participants' statements, it is necessary to reflect on the conditions under specific care is provided in cases of shortage of nursing professionals. It is necessary to think about work conditions because of the possibility of workload, which can lead to a higher risk of incidents, besides the influence of psychological and physiological factors and tiredness, among other issues.

It is important to evaluate the work done in institutions. Among other aspects, the aim of this evaluation is to improve workers' actions, as well as to promote patient safety and reflection on the 'institutional/organizational' factors that contribute to the occurrence of incidents.

Safety incidents related to human factors

Incidents result from several other situations, in other words, it has a multicausal character. Given this framework, it is understood that health care professionals are susceptible to incidents in situations where technical and organizational processes are complex and poorly planned.[17]

Human factors can be classified into knowledge/skills and psychological and physiological factors. The following factors related to knowledge/skills were highlighted: lack of technical skills in carrying out procedures, incorrect evaluation, and information or procedure failures. The following psychological aspects were highlighted: boredom, stress, frustration, and anxiety. On the other hand, physiological aspects included, among others, fatigue, sleep, drug use, and alcohol use. All of them affect, in some way, the workers' cognitive processes, compromising patient safety.[4]

Many causes can lead to errors during the preparation and administration of medicines. In this context, illegible writing, wrong doses, workload or distractions, tiredness, lack of knowledge of drug effects and diseases, may be part of the daily routine of health care workers. In this regard, a study revealed that the main factors leading to errors were workload and lack of attention.[18]

In a recent study, it was shown that the main causes of incidents related to the drug chain are related to the lack of compliance with previously established routines.[19] Thus, situations involving haste, lack of attention, shortage of employees, tiredness, lack of knowledge, distraction, workload, and lack of interest were considered by respondents as contributing factors in the occurrence of safety incidents.

> *"[...] haste; lack of attention; sometimes, lack of staff; critically ill patients; and colleagues who are new graduates. You have to have skills. You have to have more attention. So, it's very easy to make mistakes".* (I2)

> *"[...] tiredness, lack of knowledge, moments of distraction. Some [nurse technicians] have another job, and others bring problems unrelated to work".* (I4)

> *"Lack of interest, patient's condition severity, not enough time of rest at home, stress [...]. People do not analyze the prescription. They check them briefly and say that everything is ok. Then, they prepare the medication".* (I15)

The study findings are in line with those from another study, which pointed out that the most frequent causes of medication errors among nursing professionals are workload and tiredness.[20] Workload was identified as a risk factor for patient safety since it enables the occurrence of numerous adverse events. Among the adverse events pointed out, medication administration is one of the most frequent and represents a risk to the patient's life.[21]

It is understood that this situation is even more complex in intensive care units since the demands and the severity of the patients' clinical condition is proportionally higher compared to other units.

Personal factors also deserve attention:

> *"You have to be always updating your skills because new tests always arise. You have to be humble enough to ask, check the medical prescription, and know how the medicine is prepared, its function, and its effects on the body".* (I1)

> *"[...] attention, not being distracted. You have to check the prescription, the patient's name, bed, and medication route before administration. You have to take the prescription along, make sure that the patient is receiving the correct medication, and know how the dilution is performed. If you don't know how to do these things, you should ask for help".* (I5)

> *"I check the labels. I think you have to check everything. Sometimes there are too many things: central venous access, nasoenteral or nasogastric probe, and peripheral access. They're all together. These days the ampoules are all the same, so you have to take care of what is written. The letters are small, and we have to read them in the small hours, sometimes feeling sleepy. So, it's complicated!"* (I10)

Factors such as professional update, attention, humility, prescription checking, and correct medication administration are some important actions for preventing incidents related to drug therapy. Nursing professionals' knowledge and skills used when they administer medications are important factors in medication errors.[8] In this sense, individual factors such as lack of attention, memory lapses, inexperience and/or lack of ability, poor academic training, lack of interest, care, and haste favor the occurrence of medication errors.[22]

The factors that can help to minimize the occurrence of incidents have been highlighted. Shift changes, attention, checking of prescription and medication labels, correct identification of the patient, and observance of the five steps in the process of administering medications. Nurses on duty are responsible for shift changes, allowing the next nurse and nurse technicians to work.

> *"The nurse technician reports some intercurrence and then the nurse on duty provides information of all patients to the nurse who will work next shift. We listen to everything. If we have any questions, we can ask".* (I2)

> *"The nurse receives the information about the shift, and we listen while checking everything that the patient presents.*

Then, she [nurse] assign each employee to care for one patient". (I11)

It is noticeable that there is an already established organization in the unit centered on the figure of the nurse, with little interaction between the professionals involved in the shift change. Nurse technicians listen to nurses most of the time, limiting themselves to workers who only report 'some intercurrence'.

It is understood that shift changes involving the exchange of information between nurse technicians can result in more accurate data since they are responsible for a smaller number of patients. Another factor to be highlighted is that nurses need to reconcile care with other activities, especially those of managerial nature.

The occurrence of incidents can be minimized through changes in managerial and professional attitudes, strengthening of leadership and knowledge, improvement in access, quality and use of medical products, and competent and productive maintenance of professionals.[23]

It is observed that working conditions can lead to problems in several places. Among them, the relationship between occupational stress and medication error stands out. In view of this, health services need to undergo a transformation in order to promote patient safety. Nursing contributes decisively to incident prevention.[1]

Another issue is the fact that the nursing professionals worked double or triple shifts, which led to workload. As eight of the 15 interviewees reported having two jobs, fatigue resulting from double work shifts was an important issue, which can also lead to errors. These factors contributed to workers' physical and mental exhaustion, which highlight the increased risk of incidents stemming from "human factors". Hence, hospital management support, especially regarding the supply of resources, is recommended for improving patient safety. Furthermore, organizational training and continued education featuring training suggestions and implementation of protocols aiming at the standardization of care should be promoted.[24]

CONCLUSIONS

Work routine, patients' complex clinical conditions, fragmentation of care, physical structure, and number of nursing professionals were cited as institutional/organizational factors that contributed to the occurrence of incidents during drug therapy in intensive care units. Among the human factors, lack of attention, shortage of employees, tiredness, lack of knowledge, distraction, workload, and lack of interest were highlighted.

Nevertheless, shift changes, attention, checking of prescriptions and medication labels, patient identification, and the five steps in the process of administering medications were pointed out as human factors that can help to minimize their occurrence. It is understood that the nursing professionals' perceptions were related to the organization of work routines instituted in the intensive care unit, the nursing team's knowledge and skills, and some personal aspects.

The ideas here discussed can be directly applied not only within the institution in which the study was carried out but also in other institutions since they can adopt administrative and assistance measures aiming at patient safety. This study can also serve as a basis for professionals and managers to promote reflection on the subject, which is a basic condition toward patient safety.

This study presents limitations that should be recognized. As it involved only registered nurses and nurse technicians from one hospital, it is impossible to generalize the results obtained. Nonetheless, this research contributed to better understanding the addressed topic.

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