

Errors in parenteral medication administration: nursing technicians' perspective

Erros na administração de medicamentos via parenteral: Perspectiva dos técnicos de enfermagem
 Errores en la administración de medicamentos por vía parenteral: perspectiva de los técnicos de enfermería

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Descritores

Erros de medicação; Vias de administração de medicamentos; Técnicos de enfermagem; Cuidados de enfermagem; Segurança do paciente

Descriptores

Errores de Medicación; Vías de administración de medicamentos; Enfermeros no diplomados; Atención de enfermeira; Seguridad del paciente

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Abstract

Objective: To analyze the nursing technicians' understanding of errors and adverse events related to parenteral medication administration.

Methods: This is a qualitative, descriptive and exploratory study conducted with 25 nursing technicians at a university hospital in Northeastern Brazil, between March and June 2017. An interview script with open questions was used for data collection. In the data analysis, the Descending Hierarchical Classification method was used through the IRAMUTEQ software. Minayo's thematic analysis technique was chosen for content analysis.

Results: In the analysis of the Descending Hierarchical Classification, five classes were obtained, from which the following categories emerged: Nursing technicians' understanding of medication errors; Nursing technicians' understanding of adverse events; Associated factors and strategies for preventing errors and adverse events; and Conduct before the occurrence of errors and adverse events.

Conclusion: Nursing technicians showed that their understanding of adverse events is limited to the concept of adverse reactions. They understand that its occurrence is linked not only to lack of attention but also to extrinsic factors such as work overload, a considerable number of patients and inadequate dimensioning. They recognize the importance of communication and notification in this process for improving patient safety.

Resumo

Objetivo: Analisar a compreensão dos técnicos de enfermagem sobre os erros e eventos adversos relacionados a administração de medicamentos via parenteral.

Métodos: Estudo de abordagem qualitativa, descritivo e exploratório. Realizado com 25 técnicos de enfermagem em um hospital universitário do Nordeste no período de março a junho de 2017. Para coleta dos dados, utilizou-se um roteiro de entrevista com perguntas abertas. Na análise de dados utilizou-se o método da Classificação Hierárquica Descendente através do software IRAMUTEQ e para análise de conteúdo optou-se pela técnica de análise temática de Minayo.

Resultados: Na análise da Classificação Hierárquica Descendente foram obtidas cinco classes, a partir delas emergiram as categorias: Compreensão dos técnicos de enfermagem sobre erros de medicação; Compreensão dos técnicos de enfermagem sobre eventos adversos; Fatores associados e estratégias de prevenção de erros e eventos adversos; e Conduta diante da ocorrência de erros e eventos adversos.

Conclusão: Os técnicos de enfermagem mostraram que sua compreensão sobre eventos adversos é limitada ao conceito de reações adversas, entendem que a sua ocorrência está atrelada não somente a falta de atenção, mas também a fatores extrínsecos como sobrecarga de trabalho, número considerável

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de pacientes e dimensionamento inadequado, e reconhecem a importância da comunicação e notificação nesse processo para a melhoria da segurança do paciente.

Resumen

Objetivo: Analizar la comprensión de los técnicos de enfermería sobre los errores y eventos adversos relacionados con la administración de medicamentos por vía parenteral.

Métodos: Estudio de enfoque cualitativo, descriptivo y exploratorio. Realizado con 25 técnicos de enfermería en un hospital universitario del Nordeste de Brasil en el período de marzo a junio de 2017. Para la recolección de datos se utilizó una entrevista con preguntas abiertas. En el análisis de datos se utilizó el método de clasificación jerárquica descendente a través del software IRAMUTEQ, y para el análisis de contenido se optó por la técnica de análisis temático de Minayo.

Resultados: En el análisis de la clasificación jerárquica descendente se obtuvieron cinco clases, de las cuales surgieron las siguientes categorías: Comprensión de los técnicos de enfermería sobre errores de medicación, Comprensión de los técnicos de enfermería sobre eventos adversos, Factores asociados y estrategias de prevención de errores y eventos adversos, y Conducta ante episodios de errores y eventos adversos.

Conclusión: Los técnicos de enfermería demostraron que su comprensión sobre eventos adversos está limitada al concepto de reacciones adversas, entienden que los incidentes están vinculados no solo a la falta de atención, sino también a factores extrínsecos como sobrecarga de trabajo, número considerable de pacientes y dimensionamiento inadecuado, y reconocen la importancia de la comunicación y notificación en este proceso para mejorar la seguridad del paciente.

Introduction

Patient safety is the act of avoiding, preventing or reducing adverse events (AE) or injuries caused in the process of medical, hospital and home care.⁽¹⁾ Adverse events are incidents that result in harm to patients and damage the structure or function of the body and/or any effect arising from it, which may be physical, social or psychological.⁽²⁾

Adverse events can be consequences of errors, defined as the inability to complete a planned action and/or the use of an incorrect plan. According to the Swiss Cheese model proposed by James Reason to explain errors, they occur due to active (at the operational level) and latent (within the organizational system) failures. In order to increase safety and reduce the occurrence of errors and AE, barriers for preventing both types of failures are necessary.⁽³⁾

A study on AEs that resulted in deaths registered in the Notification System for Health Surveillance was conducted in Brazil. It showed 63,933 events in the period from June/2014 to June/2016, of which 0.6% resulted in death, and the predominant type of notification was related to failures in delivering healthcare (49.6%).⁽⁴⁾

Internationally, in a study conducted in six Belgian hospitals, 465 AEs were found in 830 patient records, of which 46% were preventable, and the main ones were related to drug therapy (25.6%).

⁽⁵⁾ In Mexico, a multicenter study found that among 137 AEs reported by nursing in seven institutions,

75% could be avoided.⁽⁶⁾ In another study conducted in surgical units in Spain, the prevalence of AEs was 36.8% (0.5 events per patient), and 56.2% were preventable.⁽⁷⁾

In the perspective to avoid unwanted complications to patients' health during nursing care, specialized care with parenteral administration stands out. This procedure involves more than the administration of a drug and must be performed by professionals who know the fundamental aspects of the technique, i.e., the nursing team. Since it is often performed by nursing technicians and has the potential to cause harm to patients, measures of safety and error prevention should be adopted.⁽⁸⁾

To avoid unintended consequences, health institutions have been concerned with adopting patient safety practices.⁽²⁾ Thus, the guiding question of this study was: What is nursing technicians' perspective about errors and adverse events in parenteral medication administration? For this purpose, the objective was to analyze nursing technicians' understanding of errors and adverse events related to parenteral medication administration.

Methods

This is a qualitative, descriptive, exploratory study, in which the Consolidated Criteria for Reporting Qualitative Research (COREQ) international guide was used, and the 32 domains were met to

guarantee a valid scientific method. This study was conducted in a University Hospital in Northeastern Brazil with 32 medical specialties, 190 hospital beds, 15 Intensive Care Units (ICU), ten surgery rooms, where high and medium complexity services are offered. Data collection occurred between March and June 2017.

Participants were nursing technicians working in care units of the hospital: admission, hospitalization, surgical center and ICU. In an ideal qualitative sample, the number of participants is defined when data present redundancy or repetition (according to researcher's assessment) and reflect the multiple dimensions of the phenomenon studied.⁽⁹⁾ Thus, the final sample was selected for convenience and composed of 25 nursing technicians, out of a total of 412 professionals working under a formal employment contract, with a weekly workload of 36 hours. Nursing technicians who were not on leave during the data collection period were included, and those with less than six months of work time were excluded.

Data were produced by applying a guided interview with open questions about the following topics related to parenteral medication: understanding about medication error/AE; factors that contribute to errors in the application/AE; strategies that can minimize the occurrence of medication errors/AE; conduct taken in the face of a medication error/AE; and experience of the event of some medication error/AE.

Initially, an atmosphere to better welcome participants was established. The interview script did not need modifications to be understood by participants. They were invited to participate in the study by the researcher in their workplace. Interviews were then conducted at an agreed time and place. The responsible researcher was adequately trained. She is part of a patient safety research group and has received training in the topic. Some nursing technicians refused to participate in the study due to lack of time. Interviews lasted an average of 15 minutes, without the presence of non-participants. They were digital audio-recorded and fully transcribed. There was no need for repeated interviews.

For data processing, the IRAMUTEQ software (*Interface of R pour les Analyses Multidimensionnelles de Textes et de Questionnaires*) was used. This software performs different processing of statistical analysis on the textual corpus. In this study, the Descending Hierarchical Classification (DHC) method was chosen, through which the texts were categorized into classes according to their respective vocabularies. In this distribution, similar and different text segments from other classes were obtained.⁽¹⁰⁾

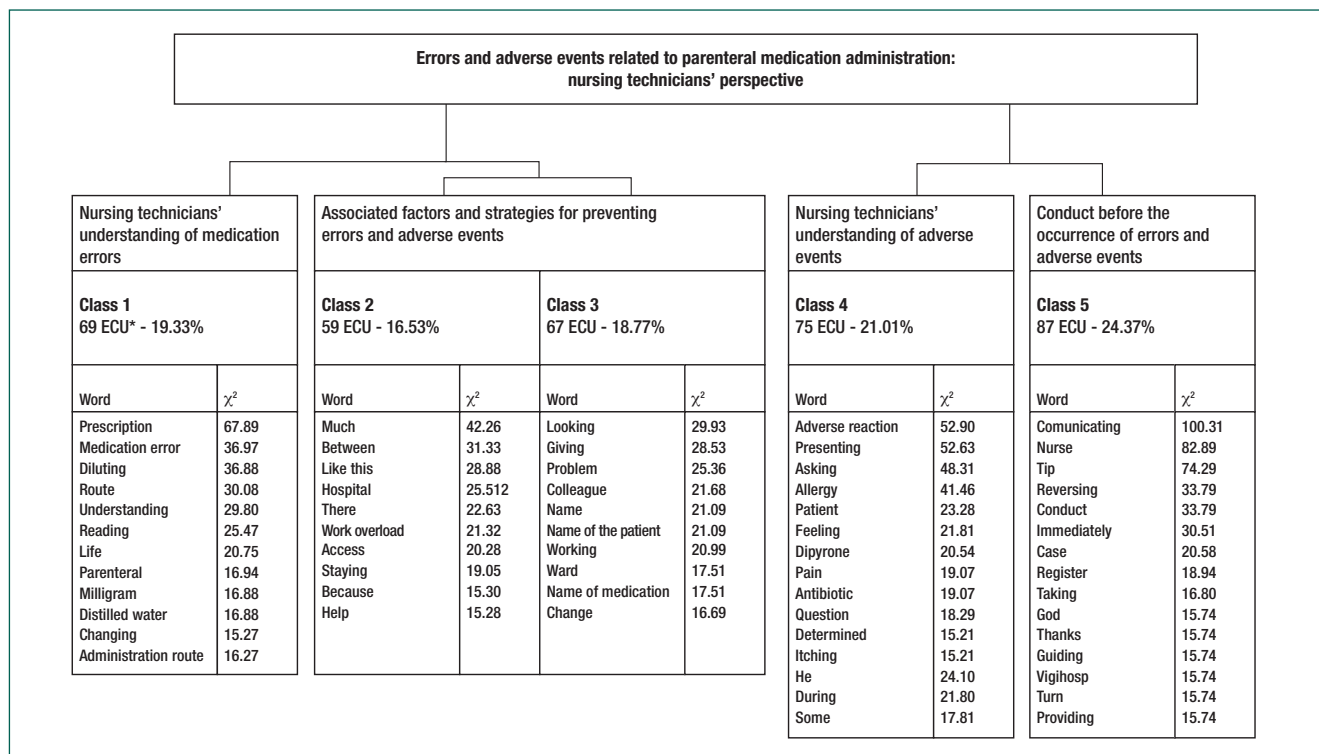
Thematic content analysis was performed in three moments: pre-analysis, which is the step facilitated by the use of IRAMUTEQ; exploration of the material, aimed at transforming the raw data and reaching the core understanding of the text; and treatment of results, in which the author makes inferences and interpretations.⁽¹¹⁾

The study followed the ethical principles of research involving human beings set out in Resolution number 466/12 of the National Health Council. It was submitted to the Research Ethics Committee of the Universidade Federal do Piauí and approved under opinion number 1.962.182, CAAE: 64475317.1.0000.5214, March 17, 2017. Participants in this study signed two copies of the Informed Consent form.

Results

Most professionals were female (88%), the average age was 35.52 years (± 6.4), with a predominance of the age group 25-34 years (48%). Regarding the level of education, despite being hired for a mid-level position (nursing technician), most participants had completed higher education (56%). This characteristic did not interfere in professionals' perception of the issues addressed. The percentage of 40% had more than ten years of work time.

The IRAMUTEQ recognized 357 Elementary Context Units (ECU) in the analyzed segments, with 83.61% of the corpus utilized. From the DHC, five classes were obtained, named by the researcher according to the analysis of meanings and significance of the corresponding words and



ECU - Elementary Context Units

Figure 1. Thematic structure of errors in parenteral medication administration: nursing technicians' perspective

the most significant ECU of each class, originating four categories: Nursing technicians' understanding of medication errors; Nursing technicians' understanding of adverse events; Associated factors and strategies for preventing errors and adverse events; and Conduct before the occurrence of errors and adverse events. The word relationships of each class and the X² with a significance level of <0.0001 are also presented (Figure 1).

Class 1. Nursing technicians' understanding of medication errors

In class 1, the total of ECU analyzed was 19.33% and it showed the interviewees' understanding of medication errors. The most frequent words were "prescription" (X² = 67.89%), "diluting" (X² = 36.88%), "route" (X² = 30,08%), "understanding" (X² = 9.80%) and "reading" (X² = 25.47%).

According to statements below, for professionals, medication errors occur when the procedure causes some type of harm to patients' health.

“Administering a patient’s medication to another patient or administering a diluted medication that

is not the same as in the medical prescription or not administering within the time specified in the prescription.” (T1)

“Any administration that causes some harm to the patient. In the case of parenteral medication, an expired medication, medication changes, a medication in which the appropriate diluent was not used, an unbalanced dilution, among others”. (T2)

Classes 2 and 3. Associated factors and strategies for preventing errors and adverse events

Class 2 covers 16.53% of the total ECU and class 3 represents 18.77%. Through the analysis of the meaning of words and the relationship presented by the dendrogram between the two classes, we chose to group them into one category.

The content of class 2 indicated that “work overload” (X² = 20.43%) is related to “hospital” (X² = 25.61%) and “times” (X² = 22.63%). Therefore, the understanding that occurrences of errors were related to factors such as hospital routine with high demands.

“It can happen because of work overload, lack of attention, I think that. [...] this can lead to errors”. (T8)

“We always hear in the nursing station that co-workers have a lot of patients, the work overload.” (T15)

The content of class 3 pointed to “looking” ($X^2 = 29.93\%$), as a way of paying more attention to the procedure, and an important strategy for avoiding this error or AE. The frequency of words “name of the patient” ($X^2 = 21.09\%$) and “change” ($X^2 = 16.09\%$) is highlighted. The statements below show the interventions to avoid errors and AE mentioned by professionals.

“More training for technicians, reducing the number of patients. Here, the number of patients is enormous, and we are left with a lot of patients; it’s such a rush”. (T23)

“Actually, it is always paying more attention when checking the medications you’re preparing, and you’re going to administer, both in the act of preparation and in the act of administration. Always check the medical records, check with the medication you’re going to administer, the patient’s name, medication, the route, to minimize errors”. (T25)

Class 4. Nursing technicians’ understanding of adverse events

Class 4 reaches 21.01% of the ECU, categorized as professionals’ understanding of AE. The most cited words in the statements were: “adverse reaction” with $X^2 = 52.90\%$, “presenting” ($X^2 = 52.63\%$), “asking” ($X^2 = 48.31\%$) and “allergy” ($X^2 = 41.46\%$).

The speeches of participants demonstrated that their concept of AE is limited only to the adverse reaction, as seen below.

“It can be when the patient takes the medication and doesn’t feel well, showing some symptoms such as redness, itching, pain, malaise, nausea”. (T7)

“In this case, it would be a reaction, medication is administered, and the patient has an unexpected

reaction, let’s say that blood pressure drops, sweating, things that are not supposed to happen if you take that medication.” (T12)

Class 5. Conduct when errors and adverse events occur

Class 5 reaches 24.37% of the total ECU. Its content suggests that “communicating” ($X^2 = 100.31\%$) the error is a remarkable element in the speech of interviewees, with emphasis on communication with the “nurse” ($X^2 = 82.89\%$). Other words also were highlighted for their significant X^2 : “reversing” (33.79%), “conduct” (33.79%) and “immediately” (30.51%).

The interviews demonstrated that participants realized the importance of recognizing and communicating AEs. In addition, interviewees highlighted the relevance of the notification in the management information system of the hospital (Portuguese acronym: VIGIHOSP).

“Communicating the fact to the nurse who is doing follow-up, interrupting the medication and communicating with the doctor on-duty so that necessary measures are taken. I think everything involves communication.” (T24)

“It has to be registered in the VIGIHOSP because it has several fields that will direct to the position to adopt in the face of the fact.” (T8)

Discussion

Despite the complexity of the procedure, parenteral drug administration is essential for many hospitalized patients. Mistakes in medication administration through this route are common. They can cause anxiety for healthcare professionals and patients, and reduce their confidence in the care provided. For this reason, parenteral route medication errors become a topic of great concern for managers, manufacturers and healthcare providers.⁽¹²⁾

In this study, interviewees demonstrated superficial knowledge about the concept of AE related to parenteral medication. Their understanding was re-

stricted to the description of Adverse Drug Reaction (ADR) and Therapeutic Ineffectiveness (IT), which corroborates with a study conducted with health professionals working in ICUs of a university hospital in Goiânia.⁽¹³⁾

In line with such a study, another one has also identified the lack of knowledge of the nursing team. Given this scenario, it is possible to infer the need for changes in the training curriculum of this category, especially at the technical level, but also at the higher level to address the lack of knowledge and obtain good safe medication practices.⁽¹²⁾

As observed in the present study, errors occur as a result of the interaction of several factors, in addition to overload, such as patients' profile, lack of knowledge of professionals, drug label that is difficult to identify, disorganization in the storage of medicines, incomplete prescriptions, absence of nursing history, illegible writing, inappropriate use of decimal places and abbreviations, lack of mathematical knowledge, verbal prescriptions, transcriptions of errors, lack of care, forgetfulness, lack of attention and distraction.⁽¹³⁾

Participants highlighted the importance of preparing the appropriate medication for error prevention. When reconstituting or diluting medications, standardization should be considered in order to improve efficacy and promote greater patient safety. For example, double-checking and checking the nine rights of medication administration and the use of protocols.⁽¹⁴⁾

During medication preparation, nursing technicians can get distracted when interrupted, and the high workload can predispose them to lack of attention. In a study in Turkey, the preparation of 2340 doses of 200 types of medication was observed. It was found that 36.1% of interruptions were caused by patients' companions and team members.⁽¹⁵⁾ The disruption and excess of activities linked to the responsibility to administer parenteral medications may be contributing factors to errors.

Strategies suggested to minimize these errors were periodic meetings between employees and managers, changes in the work process, such as the standardization of a double checklist between the nursing technician and nurse, and double checking of preparation.

The correct management of high-risk drugs should be considered a priority issue in clinical practice, with the presence of educational and organizational strategies such as protocols for storage, prescription, dispensing, preparation and administration. Also, the implementation of new technologies in the work process must be taken into account.⁽¹⁶⁾

Professionals in this study recognized the importance of reporting errors and highlighted the notification in the information system. Communicating failures to other health professionals was also evidenced in a qualitative study with nurses from the state of São Paulo, who considered the importance of reporting errors to the entire team and management. These nurses also added a need that was not observed by technicians in the present study, which is informing the patient and the family about the occurrence of AEs.⁽¹⁷⁾

Reporting medication errors in information systems helps to identify failures in the processes and can contribute to preventing new incidents. When indicated, this information can be used to understand the causes better and develop strategies to prevent future harm to patients. However, this must be a voluntary act in a guilt-free context and from notifications, investigations must be carried out in order to improve the practice.⁽¹⁶⁾

Adverse Events have implications for patients, professionals and institutions, which can cause personal, material, and moral damages, as well as of service prestige, in addition to higher exposure to risks. The financial expenditures increase and indicators of quality and care safety decrease. Concerning professionals involved, punishments and dismissals can occur. They can affect workers' performance and their emotional balance, thereby triggering feelings of incapacity, incomprehension and unhappiness. Strategies for preventing AEs include continuing education actions and service organization. Health professionals should be encouraged to notify AEs, and educational activities should be simulated from the context of health practice as a path to safe and quality care.⁽¹⁸⁾

The study is relevant but was limited by the difficulty of discussing this subject. As professionals still feel uncomfortable in discussing human error

in a dialogical manner, some information may have been omitted at the time of the interview as a result of the error punishment culture rooted in this workforce. All previous clarifications about confidentiality were provided so that this limitation did not influence the study results.

The results of this study can contribute to professional clinical practice because a lack of understanding of the problem of AEs from the nursing technicians' perspective was identified. Subsidies were offered for the development of prevention strategies and intervention plans, such as action plans aimed at minimizing errors and AEs related to parenteral medication to improve and refine the quality of care and contribute to the science of care. Furthermore, it is expected that this study will stimulate new studies seeking to explore the processes and agents involved with these incidents, for understanding them better and ensuring patient safety.

Conclusion

Nursing technicians' understanding of AEs proved to be limited only to adverse reactions, adverse or side effects. They understand the occurrence of AEs is linked not only to the lack of attention but also to extrinsic factors such as work overload, a high number of patients and the spread of errors. The suggestions for preventing and overcoming mistakes and AEs provoked by these factors were the appropriate sizing of the team, more organized schedules, training and the use of standard operating procedures and protocols established by the institution. Although professionals have not mentioned the open communication with patients and family members, they recognized the importance of identifying and communicating incidents to the entire health team and also reported that they perform notification in information systems.

Collaborations

Cardoso SR, Santos JDM, Abreu IM, Carvalho NAR, Santos AMR, Madeira MZA and Avelino

FVSD declared they have contributed to the study design, analysis and interpretation of data, writing of the article, relevant critical review of the intellectual content and approval of the final version to be published.

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