



Nursing practices in the prevention of adverse events associated with the use of medications in intensive care patients: A scoping review

Práticas de enfermagem na prevenção de eventos adversos associados ao uso de medicações em pacientes em cuidados intensivos: Revisão de escopo

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1 INTRODUCTION

Intensive Care Units (ICUs) are highly complex sectors, where the experience and skills of the multiprofessional team are necessary for the safe care of critically ill patients. The workload and stress can affect patients and their families, as well as the nursing staff, and can impair the quality and safety of the care provided (BATISTA et al.,2021).

In Brazil, the Ministry of Health (MS) established the ordinance No. 529/2013, with the creation of the National Program for Patient Safety (PNSP), which aims to improve health care, with safety and organization initiatives, through the institution of risk management in health care areas. To support the determinations of the PNSP, the National Health Surveillance Agency (ANVISA) published the RDC No. 36 of July 25, 2013, in which it is mandatory the implementation of patient safety centers (NSP) in all public and private health services, aiming to promote and support actions focused on safety, to ensure work processes that can generate less risk to the patient (BATISTA et al.,2021).

Patient safety is characterized as the reduction to the minimum acceptable risk of unnecessary harm related to health care (SILVA, 2021). It has become one of the main goals of health services, both due to the impact with the expenses resulting from lack of safety, as well as due to damages suffered during care (SOUZA, 2018).

Patient safety in intensive care depends on several aspects and nurses can contribute to define strategies and implement actions to minimize risks, prevent incidents and ensure safe care (ARBOIT et al, 2020).

Intensive care is an environment where there are constant expectations in relation to the patient's clinical condition, which requires the professional to acquire specific skills



and competencies, combining scientific technical knowledge and mastery of a number of technologies, aiming at a safe and better quality care (ARBOIT et al, 2020).

To ensure safe care, adverse events (AE) in health services, especially in Intensive Care Units should be discouraged, because it brings the patient serious complications in their treatment during the stay in the sector. It is defined as AE, among the various existing meanings in the world, as "an injury or unintentional damage caused to the patient by the assistance intervention, and not by the underlying disease in the avoidable, non-preventable or error", and may cause temporary or permanent damage and even death among users of health services (ZAMPOLLO, 2018).

It is understood that the incidence of adverse events has significant repercussions on the Unified Health System (SUS) in several aspects causing an increase in morbidity, mortality, duration of treatment of patients and in care expenses, in addition to reflecting in other areas of social and economic life of the country.(ZAMPOLLO, 2018). Adverse events are incidents, with damage that can result in prolonging the length of hospitalization. Nursing professionals have the safety and ability to perform the notifications. However, the fear regarding the punitive culture, issues such as work overload, ignorance and forgetfulness lead to the underreporting of Adverse Events (SOUZA, 2018). As pointed out by Campos et al., (2022) that underreporting and omission of data is still a problem in many institutions, associated with the punitive character attributed to the error, which hinders the implementation of measures to promote patient safety and improve the quality of care.

Drug therapy is the most widely used alternative and represents a major advance in disease prevention and treatment. However, the unnecessary or incorrect use of medicines can trigger or worsen morbidities, compromising the quality of life of users or even causing death, being the drug-related morbidities currently considered a public health problem (CORTES; SILVINO, 2019).

Adverse events associated with the medication process are a frequent reality in intensive care units and are considered a serious public health problem, since, besides being responsible for increased morbidity and mortality among patients, they also cause unnecessary expenses to health systems (RIBEIRO et al., 2021). Medication errors are considered common events that can occur at any stage of the system and are able to attribute clinically significant complications and impose significant costs to the health system. Estimates indicate that medication errors in hospitals cause more than seven



thousand deaths annually in the United States of America, generating relevant tangible and intangible costs (ZAMPOLLO, 2018).

Critically ill patients have a high risk of developing Adverse Drug Events due to factors such as the complexity of care, pathophysiological changes characterized by organic dysfunctions (changes in pharmacokinetics and pharmacodynamics), large number of medications administered (polypharmacy), complex therapeutic regimens, increased length of hospital stay and therapeutic behaviors (GOMES, 2017). It is understood that the incidents are related to failures in work processes, being important to verify the presence of weaknesses and risk factors, in addition to adopting preventive strategies, since they can generate damage and harm to patients as well as additional costs to the health system. In this sense, there is a need for the development of studies that assess this relevant public health problem among critically ill patients, in order to assist health professionals in the search for strategies to prevent its occurrence and minimize risks (CAMPOS et al., 2022).

In this context, the role of nursing stands out, because in addition to playing a leading role in the administration and monitoring of drug therapy, the complexity of intensive care requires greater knowledge and commitment of the professional in conducting the process. However, although the law of professional practice recommends that the most complex practices are performed by nurses, it has been observed in everyday practice that nurses, technicians and nursing assistants have similar assignments in drug therapy (MANZO et al., 2019).

It is also emphasized that the role of nursing within the context of multidisciplinary in the care of the critically ill patient is fundamental, the team with the greatest responsibility for care actions, therefore, assumes a privileged position to reduce the possibility of failures that affect patients. For in addition to early detection of complications, it can perform the necessary conducts to minimize damage (SILVA; CAREGNATO, 2019).

To subsidize and improve practice, it is necessary to know how the nursing team practices the administration of medications in intensive care units, as well as the circumstances in which errors occur. These investigations generate quality indicators that can provide managers with subsidies for further analysis of the practice and the problems that permeate this process and thus favor the design of actions that generate better quality care and safety for all involved (MANZO et al., 2019).



Additionally, in this scenario, outcome indicators are concrete elements for measuring the impact of health care and essential (Seiffert, 2020). The analysis of the indicators of an ICU facilitates the recognition of the institutional reality, the physical and human investments necessary to enable better quality care. The available and analyzed data contribute to hospital management, and can make it more effective and articulated (GARCIA, 2016). Adverse event rates have been incorporated as measures to evaluate the quality of health services (ALVES, 2017).

In this context, considering the impact of adverse events on patient morbidity and mortality, the characteristics of care, and the profile of critically ill patients, it is essential to constantly assess the risk of occurrence of these events. This evaluation should be performed through daily monitoring of incidents, search for related factors as well as the establishment of safe practices (CAMPOS et al., 2022).

Given the above, what techniques are used to prevent medication-related adverse reactions in intensive care unit patients?

2 OBJECTIVE

To identify in the literature which nursing practices and strategies to prevent medication-related adverse reactions used for critically ill patients in the intensive care unit.

3 METHODOLOGY

This is a literature scope review research, with qualitative data analysis, where the research sources used were scientific articles. The main question was to identify strategies to prevent adverse events associated with medication in patients in intensive care units, based on the scientific question that was constituted on the PICO strategy, where the following were defined: P - patients in intensive care; I - prevention of medication-related adverse events; C - no comparison; and O - identify strategies to prevent adverse events associated with medication

Based on these definitions, the following guiding question was established: *What are the strategies for prevention of adverse events associated with medication in patients in Intensive Care Unit?*

The Virtual Health Library (VHL) was used as a search vehicle, selecting the health evidence in the following databases: Online Medical Literature Search and Analysis System (MEDLINE), Nursing Database (BDENF), Latin American and



Caribbean Literature on Health Sciences (LILACS), and Capes Portal, using the Descriptors in Health Sciences (DeCs): Medication, Nursing, Intensive Care Unit, Adverse Events, with Boolean term AND in the publication period between 2017 and 2023. Four categories of articles were analyzed: Title, year of publication, authors and results, the survey and data collection occurred in the period May 2023.

Inclusion criteria were: articles published in the last 7 years, in Portuguese, English, and Spanish, with the full text available and meeting the study objectives.

Exclusion criteria were defined based on studies that did not address the research objective, incomplete studies, and studies published prior to 2017.

To consolidate the study, the following steps were followed: choice of theme, preliminary bibliographical survey, formulation of the problem, elaboration of the provisional plan of the subject, search for sources, reading of the material, fiching, logical organization of the subject, and finally the writing of the text.

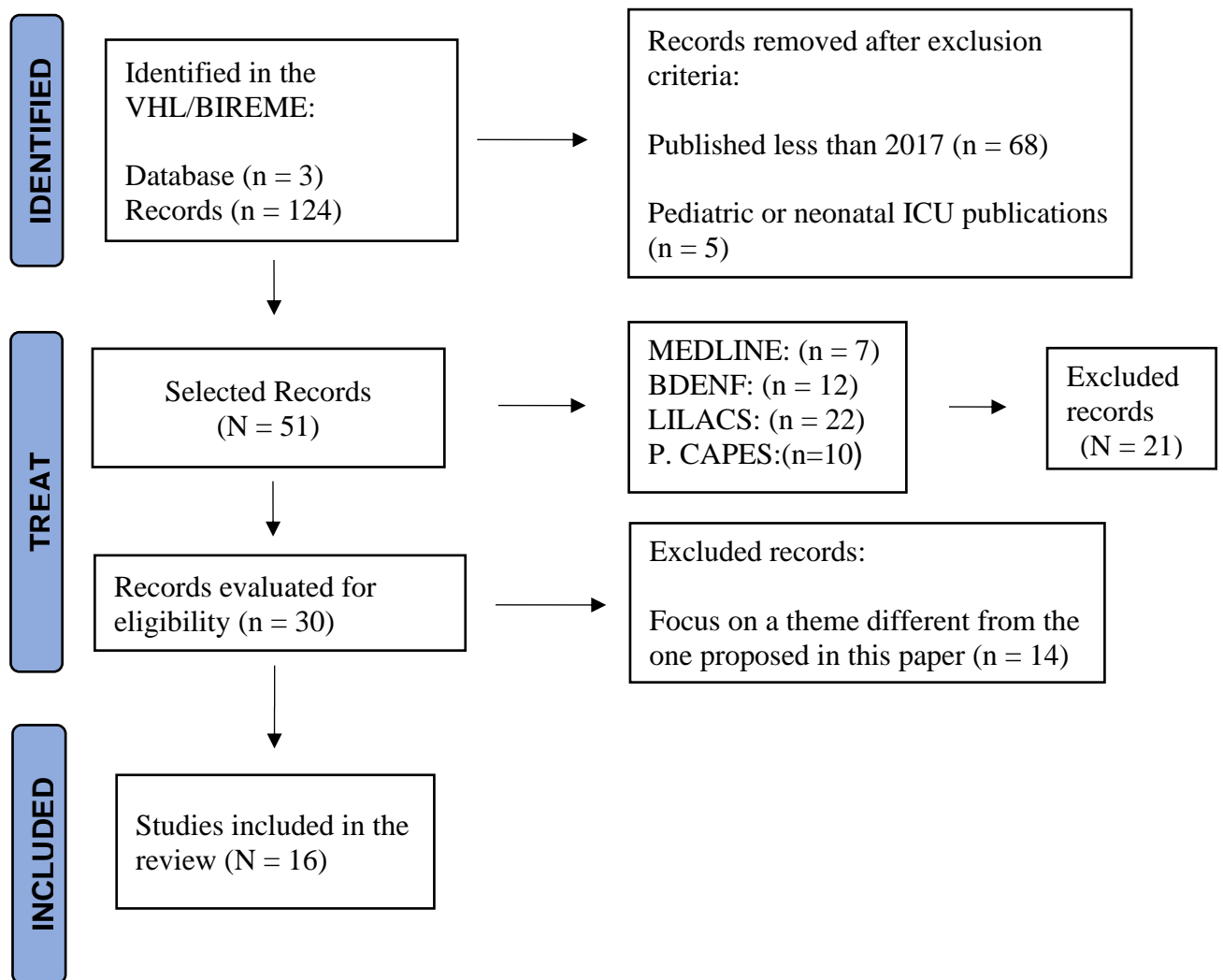
The analysis was based on a systematic reading of the articles, where the central ideas of each study were extracted, and the results were presented in the form of a table in descending order. Five categories of articles were analyzed: Title, Author, Year of Publication, Type of Study, and Results.

4 DEVELOPMENT

The first search carried out by the Virtual Health Library (VHL) platform and the Capes Portal using the combination of the descriptors Medications, Nursing, Intensive Care Unit, Adverse Events with the Boolean term AND, resulted in 124 articles, which after applying the inclusion criteria, 73 articles were discarded, and 51 articles were selected for analysis.

Of these 51 selected articles, 21 articles were excluded after reading the titles and reading the abstracts because they were not related to the objective of the present study.

Table 1- Prism Diagram: Survey description and data analysis, 2023.



After the process of selection and identification of the articles that met the inclusion criteria, prior reading of the titles and, later, of the abstracts, 16 publications were selected, which are represented in the table below:

Chart 1- Characterization of selected studies on Strategies to prevent medication-associated adverse events in patients at Intensive Care Unit, Sorocaba, 2023.

Title	Author/Year	Type of study	Results
The nurse's knowledge about the care of Potentially Dangerous Drugs	ALVES, C. de M. C. et al 2017	Descriptive study, quantitative approach	The right nine does not guarantee that administration errors will not occur, but it can prevent some of these events, improving the safety and quality of patient care. Prevention of medication errors relies on knowledge, detection of them, and performance improvements by healthcare professionals.
Implementation of risk management in processes related to medications used in intensive care units	PONTES, L.P.P et al 2017	Experience Report	It evidences the use of risk management as a facilitates the actual analysis of the main needs in the area of pharmacovigilance and improves the processes in the context of patient safety, especially in suspected ADR notifications.



Potentially dangerous drugs: identifying risks and barriers to error prevention in intensive care	REIS, M.A.S. dos et al 2018	Cross-sectional study	The study points out gaps in the recognition of Potentially Hazardous Drugs and adoption of barriers to prevent incidents. The implementation of permanent and/or continued education programs, robust risk management systems, evidence-based barriers to prevent errors, and policies to encourage a culture of patient safety are needed.
Adverse events in the intensive care unit	SOUZA, R.F.; ALVES, A. de S.; ALENCAR, I.G.M 2018	Quantitative, descriptive and retrospective study	It highlights Adverse Medication Events as one of the most frequent events in assistance. The analysis of the factors that lead to these events is information that allows understanding and reducing their occurrence, such as: lack of knowledge about medications; lack of information about patients; failures in dose administration; problems related to drug infusion devices attributed to misunderstanding of the prescription; verbal orders for medication without being prescribed.
Adherence to the patient identification protocol and safe medication.	ZAMPOLLO, N., et al. 2018	Cross-Sectional Study	<ul style="list-style-type: none"> - It was verified that 850 (89.95%) patients had the regular use of the identification wristband. The bed identification plate was present in 940 beds (99.47%). - It was found, in this study, in relation to the length of stay, that 71.96% of patients were hospitalized for up to 15 days. The longer the length of stay in the ICU, the higher the risk of adverse events. - It was verified a high adherence of the Nursing team to the care protocols related to patient identification and safe medication. A high percentage of compliance was verified in the use of the identification wristband, the bed identification plate, and identified medications
Factors associated with potential drug interactions in an Intensive Care Unit: a cross-sectional study	CORTES, Ana Laura Biral; SILVINO, Zenith Rosa 2019	Cross-Sectional Study	- Polypharmacy and the use of some specific medications such as midazolam, regular insulin and IV amiodarone showed strong and significant association with Potential Medication Interactions. The length of hospitalization also showed association with the presence of PIs with High-Watch Medications and Potentially Dangerous Medications.
Safety in medication administration: Research on nursing practice and error circumstances.	MANZO, B.F.; et al. 2019	Literature Review	- The practice of preparing and administering medications has important weaknesses that can compromise patient safety. Double-checking is an effective method for suppressing errors in medication administration
Intensive care unit: safety and adverse event monitoring.	SILVA, Monica Vanessa Ochoa da; CAREGNATO, Rita Catalina Aquino 2019	Literature Review	- We believe, however, in the use of simplified systems, optimizing the processing of information through protocols, reinforcing teamwork, assertive communication, and education, demystifying adverse events, empowering leaders engaged in the topic, and fostering knowledge about this widespread and, at the same time, challenging topic.
Factors that contribute to the occurrence of drug therapy-related incidents in intensive care	ARBOIT, E.L., et al 2020	Exploratory-descriptive study with a qualitative approach	The factors that can help to minimize the occurrence of incidents were highlighted, among them: the shift, attention, checking the prescription and medication labels, the correct identification of the patient, and the use of the right five of the medication.
Safe nursing care: medication process in intensive care	RIBEIRO, L.M.L et al 2021	Descriptive study with a qualitative approach	Evidences as factors Intervening factors in the safety of nursing care in the medication process are electronic prescribing, prescription data and abbreviations, the prescription operating system, the physical structure of the department, medication storage, organization of the work process, and the peripheral route of administration in critically ill patients.



Patient safety measures in intensive care units	SILVA, B.M.M. de O et al 2021	Integrative review	It addresses as major Adverse Event prevention measures the care of potentially dangerous drugs (PPM), implementation of the unit dose drug dispensing/dispensing system, care of infusion pumps, and computerized prescribing.
Intensive Care Medication Process: Intervening Factors for Nursing	RIBEIRO, L.M.L.; FERNANDES, M.M; ARRUDA, L.P.; ALVES, L.C.; MORAES, K.M. 2021	Descriptive Research	- The operating system of electronic prescribing and abbreviations hinders the medication process as well as the physical structure also interferes in the process of preparing and diluting the medications.
Adherence to glycemic control protocol and double-checking of medications in Intensive Care	BATISTA, B., et al. 2021	Cross-Sectional Study	Among the methods proposed to ensure the quality of care, the double-checking protocol for potentially dangerous medications is highlighted, which include opioids, anesthetics, antiarrhythmics, anticoagulants, insulin, vasoactive drugs, among others, thus requiring specific skills of professionals in the preparation and handling of these medications. It was also observed that the realization of regular audits in the institution awakens the involvement of the team to carry out the process in an increasingly correct and reliable manner to the established and expected criteria, perceived mainly in ICU F, which had the lowest compliance rates and increased to 70% in 2019
Potential adverse drug events: intensive care unit cohort	GOMES, V.S.; TREVISAN, D.D.; SECOLI, S.R. 2022	Cohort Study	- The positive correlation between the number of tracers and indirect predictor variables of AMS (length of stay, number of medications and comorbidities) points out that the severity of the patient may represent one of the main indicators of potential AMS. Thus, the use of tracers represents an essential tool in the identification and monitoring of AMS, especially in high complexity settings, in addition to encouraging actions to improve the quality of care and patient safety.
Incidence and risk factors for incidents in intensive care patients	CAMPOS, D. M. de P.; et al. 2022	Cross-Sectional Study	-Of the total of 144 (100%) incidents, the highest percentages found were related to the types clinical process/procedure 103 (71.5%) and care associated infections 22 (15.3%). A high occurrence of incidents was verified in the intensive care unit, especially in patients with longer hospital stay and use of central venous catheters.
Strategies for the prevention of adverse events in the administration of medications by the nursing staff	MENESES, et al. 2023	Study Scope Review	It was possible to find as evidence to prevent medication errors at least 10 interventions such as: identification bracelet, risk bracelet, electronic prescription, continuing education, bed identification, medication identification, nursing dimensioning, bar code on medication, checklist, the rule of 9 right, which contribute to provide quality nursing care prioritizing patient safety

SOURCE: Own Elaboration, 2023.

5 DISCUSSION

According to Souza, (2018) in his study, it is estimated that 43% of ICU patients experience at least one adverse drug event, however, 82% of these events are classified



as totally preventable. The author highlights as factors that lead to Adverse Medication Events are misunderstanding the prescription, verbal orders for medication without being prescribed, lack of knowledge about medications among others. Together with Souza, (2018), Silva, (2021) and Ribeiro, (2021), highlight the use of a computerized system for standardized electronic prescription, which decreases the risk of misinterpretation of the prescription, since some data contained in the prescription generate doubts among professionals, especially those related to the abbreviation of words, this can cause possible errors in the medication process, consequently generating adverse events in patients. Silva, (2019) believes, however, in the use of simplified systems, optimizing the processing of information through protocols, reinforcing teamwork, assertive communication and education, demystifying adverse events, empowering leaders engaged in the theme and fostering knowledge about this theme so widespread and, at the same time, so challenging, as well as Arboit et al (2020) also report that the factors that can help minimize the occurrence of incidents, among them we highlight: the passing of duty, attention, checking the prescription and medication labels, correctly identifying the patient, and using the right five of the medication.

Arboit, (2020) also believes that good communication is essential in this process of declining adverse events, as he also evidenced in his study that factors that can help minimize the occurrence of incidents include a shift change with greater interactivity between the professional who goes on duty (nurse) and those who receive the shift (nurse and technicians of the next shift), as it may result in more accurate data, since this professional is responsible for a smaller number of patients. Like him or Alves, (2017) also address in their studies the use of medication certainties as an important element in preventing medication-related adverse events. The nine right does not guarantee that administration errors will not occur, but following them can prevent a significant part of these events, improving the safety and quality of care provided to the patient during the medication administration process. It is evident then that factors such as updating, attention, humility, checking the prescription and medication labels, correctly identifying the patient, and using the right nine of medication are some important actions in preventing incidents related to medication use.

Another important factor raised in Ribeiro's study (2021) is drug interactions in the ICU. ICU professionals should pay attention to drug interactions and consider them as a factor with high potential for adverse events. Therefore, a more complete computerized information system is needed, for example, that warns about significant



drug interactions, allergies, and information relevant to the safety of the medication process. Silva, (2021) also addresses as main measures for prevention of adverse events the care of potentially dangerous drugs (MPP), implementation of the dispensing/distribution system of drugs by unit dose, care with infusion pumps and computerized prescription.

Polypharmacy and the use of some specific medications such as midazolam, regular insulin and IV amiodarone showed strong and significant association with Potential Medication Interactions. The length of hospitalization also showed association with the presence of PIs with High-Watch Medications and Potentially Dangerous Medications (CORTES, SILVINO, 2019).

For Manzo, (2019) the preparation and administration of medications has important weaknesses that can compromise patient safety. Double-checking is an effective method for suppressing the error in the administration of medications. For Batista, (2021) also argues that among the methods proposed to ensure the quality of care, the double-checking protocol for potentially dangerous medications, which encompass opioids, anesthetics, antiarrhythmics, anticoagulants, insulin, vasoactive drugs, among others, thus requires specific skills of professionals in the preparation and handling of these medications. It was also observed that the realization of regular audits in the institution awakens the involvement of the team to carry out the process in an increasingly correct and reliable way to the established and expected criteria, noticed mainly in ICU F, which had the lowest compliance rates and increased to 70% in 2019.

Gomes, (2022) concludes that the positive correlation between the number of tracers and indirect predictor variables of AMS (length of stay, number of medications and comorbidities) points out that the severity of the patient may represent one of the main indicators of potential AMS. Thus, the use of tracers represents an essential tool in the identification and monitoring of AMS, especially in high complexity settings, in addition to encouraging actions to improve the quality of care and patient safety.

Arboit, (2020) and Ribeiro, (2021) address in their studies the physical structure of the unit as a factor that interferes in the preparation process and in the inadequate storage of medications. They are often performed in another environment, far from the patients, which can contribute to the occurrence of incidents, thus, providing and maintaining an organized environment and performing the preparation of medications at the bedside are factors that undoubtedly facilitate the work processes, enhance the performance of tasks and, especially, cooperate with the provision of safer care. The



hurry, lack of attention, shortage of staff, fatigue, lack of knowledge, distraction, work overload, and stress of the nursing professional are also highlighted by them as the most frequent causes for medication errors, enabling the occurrence of numerous adverse events.

Another very important practice in the medication process is proper patient identification, Zampollo, et al (2018) found that 850 (89.95%) patients had regular use of the identification wristband. The bed identification plate was present in 940 beds (99.47%). It was verified, in this study, regarding the length of stay, that 71.96% of the patients were hospitalized for up to 15 days. The longer the length of stay in the ICU, the higher the risk of adverse events. It was verified a high adherence of the nursing team to the care protocols related to patient identification and safe medication. A high percentage of compliance was verified in the use of identification wristbands, bed identification plates and identified medications

Additionally, the authors Reis, (2018) and Silva, (2021) both bring in their studies the importance of hospital organizations to identify the PMPs (Potentially Dangerous Medications), implementation of programs of permanent and/or continuing education and robust management systems as safety strategies, since the ICU is an environment in which PMPs are highly manipulated and thus the patient is susceptible to errors. In contrast, Pontes (2017), addresses in his study another extremely important point, which is the difficulty of professionals in reporting adverse drug reactions, where he brings the importance of continuing education in raising awareness of nursing professionals about the importance of reporting and how to do it, the knowledge of professionals about the medications and the establishment of a fair, non-punitive culture.

Campos, et al. (2022) concluded that of the total of 144 (100%) incidents, the highest percentages found were related to the types clinical process/procedure 103 (71.5%) and care associated infections 22 (15.3%). A high occurrence of incidents was verified in the intensive care unit, especially in patients with longer hospital stay and use of central venous catheter.

It was possible to find as evidence for preventing medication errors in the studies by Meneses, (2023) at least 10 interventions such as: identification bracelet, risk bracelet, electronic prescription, continuing education, bed identification, medication identification, nursing dimensioning, bar code on the medication, checklist, the rule of 9 right, which contribute to providing quality nursing care prioritizing patient safety.



6 CONCLUDING REMARKS

Medication errors (ME) and adverse drug reactions (ADRs) are among the most frequent failures in healthcare, and it is important to point out that these situations often could have been avoided.

From the study, the main practices for prevention of adverse events related to medication in intensive care patients are standardized and complete electronic prescription system that warns about significant drug interactions; adequate physical structure to carry out the preparation of the medications; shift change with greater participation of nursing technicians; updating; attention; conference of the medical prescription and medication labels; correct identification of patients and the use of the right nine of the medication, identification and the improvement of professionals in relation to MPP and the encouragement and awareness about making notifications.

A safe medication system helps professionals to prevent errors, so it is extremely important that prevention strategies are strengthened and implemented to facilitate the action of medicating, thus contributing to less harm to patients and, consequently, less costs to the public sector, since an adverse event can lead to prolonged hospitalizations. The results that were obtained from this study also reinforce the need for continuing education of professionals, in order to train and update the nursing team, make them aware of the patient safety culture and for the reporting of adverse events, because it is essential that professionals are able to perform their functions safely for the patient.

The importance of further studies on this theme can also be highlighted, aiming to enable the dissemination and improvement of safety measures, especially regarding medications, in order to promote safe care and the growth of knowledge of nursing professionals on the subject.



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