



The Most Frequent Errors and Error Causes in Intravenous Medication Administration: A Literature Review

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Abstract

Introduction. Intravenous medication administration is a critical component in healthcare, which is utilized for delivering medications directly into the bloodstream to achieve immediate therapeutic outcomes. It is essential to ensure that this method of medication delivery is both safe and effective.

Aim. This literature review aims to identify the most frequent intravenous medication errors and their causes.

Methods. Literature search was performed in March 2024 utilizing PubMed, ScienceDirect, and Scopus, covering the period from February 2018 to January 2024.

Results. This literature review included 17 articles. The articles were selected to overview the most frequent intravenous medication errors, their causes, and prevention possibilities. Results have shown the most frequent types of intravenous medication errors which occur during the stages of preparation and administration: insufficient hand hygiene and not adhering to aseptic mode while preparing the medication, dose calculation errors, patient identification errors, as well as not adhering to the rules of safe medication administration.

Conclusions. Intravenous administration is a common nursing intervention and it is prone to high error rates. Nurses bear a significant amount of responsibility regarding the right way of administration and preparation of intravenous medicine. According to our review, several factors are more prone to be the cause of medication administration errors, and they include the lack of nurse knowledge, attitude and behavior, lack of hand hygiene, and distractions while preparing the medication coming from other nurses and patients or telephones. The outcomes of these factors are the most common cause of the intravenous medication errors which include incorrect dose and labeling errors.

Introduction

A medication is any substance which is introduced into the body and aims to treat or prevent diseases. For the application and preparation of the medication to be safe and to avoid possible errors, it is necessary to adhere to the medication's application rules and the 3 checks (1). The intravenous medication belongs to the group of parenteral medication administration which means it avoids the digestive tract. Intravenous delivery includes administration of the medication directly into the vein using a needle or a tube. Some medications can be administered through intravenous injection or infusion when the patient cannot take liquids and pills orally or needs fast absorption of the medication. Medications which are administered intravenously are widely used in hospitals, especially in critical care settings and emergency departments because of their immediate therapeutic effect, precise dosing and high bioavailability (2). Intravenous medication administration via infusion devices is also at high risk of errors which can compromise patient safety. Smart pump devices are used for intravenous systems and reduce critical administration errors. They are integrated with the information systems and medication libraries which set safe limits on the administered medication (3). The preparation is a complex process which requires an aseptic mode of operation and involves multiple possibilities for errors. Literature suggests that medication errors are the most common type of medical error, and intravenous medicines are at higher risk because they are complex both to prepare and administer (4). Intravenously administered medications are particularly associated with the highest medication error frequencies and more serious consequences for the patient than any other administration route. Administration, prescription, and preparation are the process phases most prone to systemic errors (4-5). Some of the errors are: wrong drug selection, dosage calculation errors, using the incorrect diluent for dilution of a certain medication, incorrect infusion rate, and administration to the wrong patient, which could lead to a number of complications (1). The prevalence of medication errors is problematic due to the different definitions and classification systems which are typically used to measure them (3). Depending on the type of error, there are different outcomes for patients, ranging from fewer and smaller complications to larger ones. The negative effects of

incorrect intravenous administration are difficult to mitigate due to immediate and complete absorption and distribution into the bloodstream (4). Errors associated with intravenous medication are especially worrisome given their immediate therapeutic effects (6). Numerous factors within the system and individual factors contribute to the occurrence of medication errors. Some of the main factors which affect the process of preparation and administration are: overworked hospital units, employee fatigue, insufficient knowledge and unsuitable environment conditions which include distractions, lack of organization and similarities in packaging. Nurses are frequently interrupted during medication administration, which can lead to administration errors. Furthermore, medication errors have been related to low-quality medical care, longer hospital stays, and significant additional medical costs, as well as the loss of patients' trust in the services offered by the hospital (4). Each of these errors can directly affect patient safety. It has been noted that some populations are more prone to be at risk of medication errors, for example children, because of their limited ability to communicate and express their complaints. Literature suggests that medication errors may be three times more common in the pediatric population than in adults. When administering medication to children, nurses need to make individual dosage calculations based on the patient weight, age and body surface area and their condition, which can lead to calculation and dosage errors. Many medications used to treat children are not available in suitable dosage formulations, but often have to be manipulated and prepared by the nurse at ward. These practices include cutting, grinding up tablets or mixing medications with food. Such manipulations are associated with high risk of errors as the bioavailability of the drugs is often unknown and unpredictable. Lack of standardization has caused confusion resulting in serious medication errors. Most of the medication are not licensed for the use in children (7). To ensure the safe application of intravenous medications, healthcare providers need to have sufficient knowledge and skills, while continuous participation in training programs can increase the knowledge and awareness of nurses (3). Intravenous medication administration is a critical component in healthcare, utilized for delivering medications directly into the bloodstream to achieve immediate therapeutic outcomes. It is essential to ensure that this method of medication delivery is both safe and effective. It should be critically considered which strategies can effectively improve safety during high-risk nursing tasks involving intravenous medication administration (8).

Aim

This systematic review aimed to identify the most frequent intravenous medication errors and their causes. By systematically reviewing the literature, it is possible to identify gaps in current knowledge and highlight areas which require further research.

Methods

A systematic literature search was performed in March 2024 utilizing PubMed, ScienceDirect, and Scopus covering the period from February 2018 to January 2024. Following the PRISMA guidelines for presenting systematic literature reviews, systematic reviews, cross-sectional studies, and multicenter observational studies were targeted. By employing a structured guideline, the authors outlined the aims, defined the study scope, and established inclusion and exclusion criteria (Table 1). During the search, the authors used the following keywords for the inclusion criteria: "nurse", "intravenous administration", and "medication error", which all needed to appear in the included articles.

	Inclusion criteria	Exclusion criteria
Type/ category of the article	Systematic review Literature review Cross-sectional study Multicenter observational study	Letters Editorials
Content (keywords)	Nurse Intravenous administration Medication error	Other
Publication date	2018-2024	Articles published before 2018
Language	English	Other

Studies which reported on the use of intravenous medication administration published between February 2018 and January 2024 were searched. The studies were included if they were published in English language and available as free full text articles. The articles which identified causes in relation to errors or mistakes from hospital staff were included. After the removal of duplicates, using the Zotero application, the search produced 1,103 relevant publications. Two reviewers (M.T, K.K.) independently selected the studies based on their titles (n=1,103). The articles fulfilling the inclusion criteria were selected for further review based on the abstracts (n=79). The abstracts were excluded if they did not provide enough relevant data (n=40). A total of 12 publications met the inclusion criteria. In addition, reference lists of the included articles were searched manually for relevant articles (n=5), giving a total of 17 included studies. The reason for including these studies is that they presented key findings, evidence, and critical insights relevant to the authors' aim. By incorporating these studies, the authors enriched and completed their systematic review.

Results

This systematic review included 17 articles published in the last 6 years (2018-2024). These articles were selected to provide an overview of the most frequent intravenous medication errors, causes, and prevention possibilities. Table 2, includes a detailed compilation of the results from these articles, including information about the authors, the year the paper was written, the aim, the type of study, the population of the research, and the country in which the article was developed.

This systematic review was based on 17 publications. These studies were conducted in the Netherlands (n=3), Jordan (n=2), Spain (n=2), England, the United Kingdom, India, Brazil, The Czech Republic, Finland, Italy, Iran, South Korea, and the United States. Seven of the studies were cross-sectional studies, five were observational studies, two were systematic literature reviews, one was scoping review, one was descriptive study, and one was a comparative study. The studies

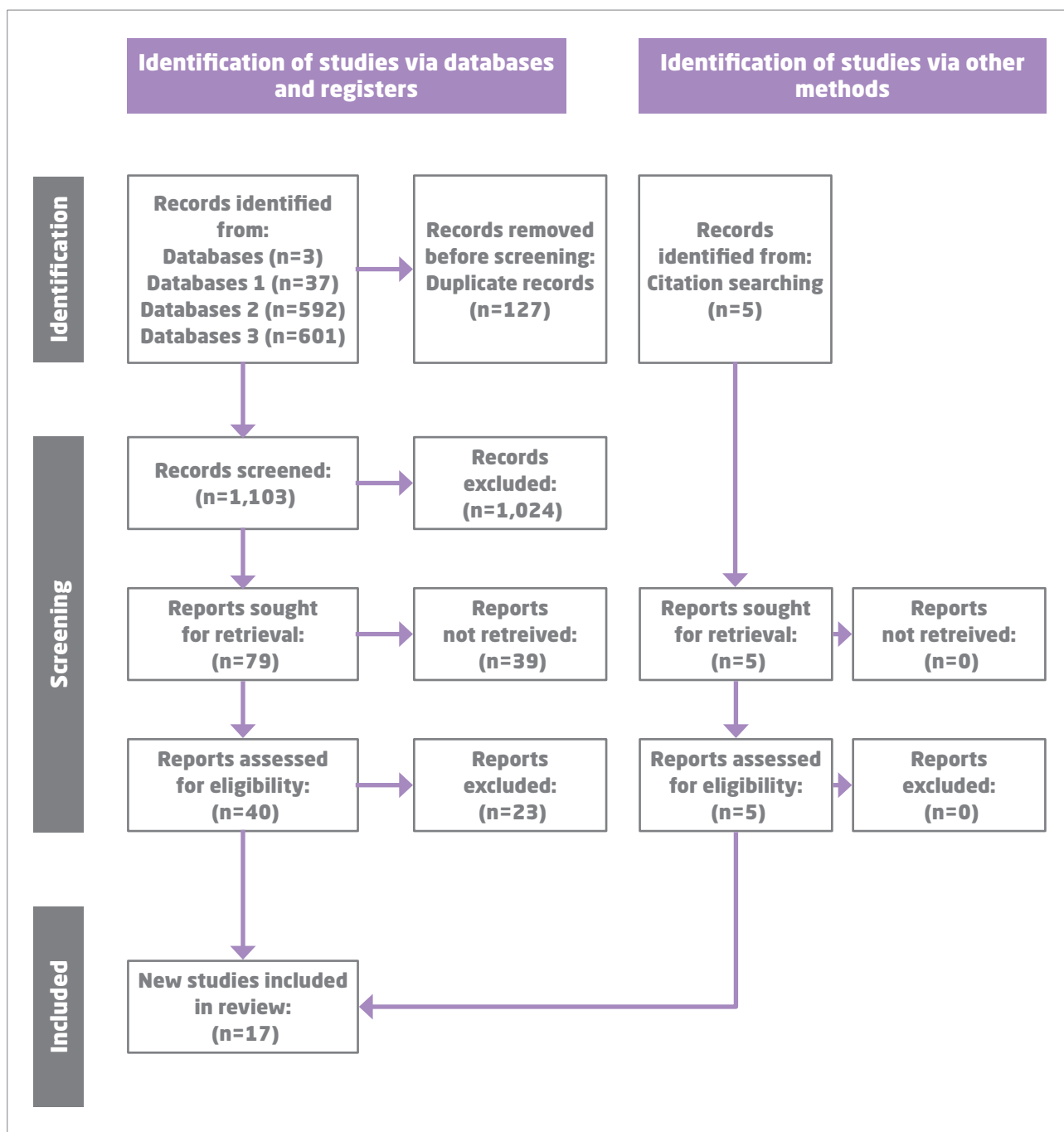


Figure 1. PRISMA flow chart

identified the most common medication errors: dose calculation, insufficient hand hygiene and not adhering to aseptic mode, not adhering to the rules of safe medication administration and patient identification errors. The selected articles include topics about the most common intravenous medication errors, meth-

ods for preventing intravenous medication errors, and the most common causes of intravenous medication errors.

Dosage calculation errors are a common error during preparation of the intravenous medication for administration. Márquez-Hernández et al. reported

Table 2. Overview of the most frequent intravenous medication errors, causes, and prevention possibilities

Authors, year	Aim	Type of study	Population	Country	Results
<i>Sutherland A, Canobbio M, Clarke J, Randall M, Skelland T, Weston E. (2018) (1).</i>	To estimate the number of intravenous medication errors per 1000 administrations	a systematic review	-	UK	The majority of errors detected during intravenous medication administration were wrong rate errors. The next most common error type associated with intravenous administration errors was wrong time administration with a mean rate. However, this was only identified in two studies. The remaining error types (wrong dose, wrong diluent, wrong volume, wrong pump setting, and dose omission) contributed less than 20% of the remaining error types.
<i>Márquez-Hernández VV, Fuentes-Colmenero AL, Cañadas-Núñez F, Di Muzio M, Giannetta N, Gutiérrez-Puertas L. (2019) (2).</i>	Culturally adjust and validate a questionnaire regarding knowledge, attitudes, and behaviors in administering intravenous medication	cross-sectional study	N=276 nurses	Spain	The most frequent error is dosage calculation. The majority of participants strongly believed that understanding intravenous medication dosage calculation could decrease medication errors. Furthermore, nearly half of them believed that computerized physician order entry systems could minimize errors in the medicine preparation stage.
<i>Blandford A, Dykes PC, Franklin BD, Furniss D, Galal-Edeen GH, Schnock KO, et al. (2019) (3).</i>	Investigate similarities and differences in practices and error types involving intravenous medication administration in the United States and England	comparative study	N=3,172 observation of intravenous medication administration	The United States, England	Patient identification errors are more prevalent in England than the United States study. This error is mostly attributed to the widespread use of barcode administration of medication. In this study, it is also revealed that there is a higher risk for potential harm for patients during gravity administration of infusion compared to infusion devices.
<i>Kuitunen S, Niittynen I, Airaksinen M, Holmström AR. (2021) (4).</i>	Identify systemic causes of in-hospital intravenous medication errors	a systematic review	-	Finland	The phases of administration, prescribing, and preparation were highly susceptible to systemic errors, particularly due to inadequate safety measures with high-alert medications, and lack of knowledge about the drug.
<i>Schutijser BCFM, Klopotoska JE, Jongerden IP, Spreeuwenberg PMM, De Bruijne MC, Wagner C. (2019) (6).</i>	To determine the frequency and causes of interruptions during intravenous medication administration	multicenter observational study.	-	The Netherlands	Frequent interruptions during the preparation and administration from patients and nurses.
<i>Yousef AM, Abu-Farha RK, Abu-Hammour KM (2022) (9).</i>	To determine the prevalence, types, severity, and other factors associated with medication administration errors	cross-sectional study	-	Jordan	Most medication administrations had one or two errors. Adherence errors were found to be the most frequent followed by incorrect drug preparation.
<i>Brabcova I, Hajduchova H, Tothova V, Chloubova I, Červený M, Prokešova R, et al. (2023.) (10).</i>	Identify the reasons for medication administration errors and the reasons for non-reported medication administration errors	cross-sectional study	N=1,205 nurses	The Czech Republic	The most common reason for medication administration errors was the similarity in the appearance of drugs, followed by name similarity and packaging similarity.

Table 2. Overview of the most frequent intravenous medication errors, causes, and prevention possibilities

Authors, year	Aim	Type of study	Population	Country	Results
<i>Mendes JR, Lopes MCBT, Vancini-Campanharo CR, Okuno MFP, Batista REA. (2018) (11).</i>	To identify the frequencies and types of medication errors in the emergency department	cross-sectional	-	Brazil	The most frequent errors were: no hand hygiene and no use of an aseptic technique. Indicating the need to develop programs focused on patient safety.
<i>Di Simone E, Giannetta N, Auddino F, Cicotto A, Grilli D, Di Muzio M. (2018) (12).</i>	To outline how nurses' knowledge, training, behavior, and attitude can prevent medication errors during the administration of intravenous medications in the emergency department	descriptive study	N=103 nurses	Italia	The most common error occurred because of heavy workloads. Drug dosage and calculation skills are essential to reduce errors during drug preparation. Computerized prescriptions could reduce drug preparation errors.
<i>Mukherjee M, Karkada R. S, Vandana K.E. S. (2020.) (13).</i>	To evaluate current healthcare professionals' practices in intravenous medication management and pinpoint the obstacles hindering safe intravenous medication handling among them	observational study	N=30 healthcare professionals	India	The majority of healthcare professionals cited heavy workloads as a barrier to safe intravenous medication management, while only a few mentioned the absence of colleagues for double-checking or lack of supervision.
<i>Cousins DH, Otero MJ, Schmitt É. (2021) (14).</i>	To adapt systems for preparing and administering injectable medications to meet evolving priorities in European hospitals	observational study	N=2,238 patients	Spain	Frequent errors are drug checking, preparation, and labeling
<i>Hamdan KA, Abeer MS. (2022) (15).</i>	To examine the ICU nurses' knowledge, behaviors, training, and attitudes when preparing and administering intravenous medications	a cross-sectional-correlational design study	N=206 nurses	Jordan	About 81.6% of the ICU nurses considered dosage calculation of intravenous drugs to reduce preparation errors. A total of 81.1% of respondents agreed that clinical skills in the safe management of drug therapy should be regularly evaluated. Only 87.9% of the ICU nurses agreed that handwashing is necessary before drug preparation and administration. Education is essential to nurses' feeling safe at administering medications, especially in critical care units, which may affect their attitudes and behaviors.
<i>Schutijser B, Klopowska JE, Jongerden I, Spreuwenberg P, Wagner C, de Bruijne M (2018) (16)</i>	Identify nurse non-compliance with safe intravenous medication administration	observational study		The Netherlands	Medical errors are inadequate hand hygiene and lack of medication verification by a second nurse.
<i>Park J, You SB, Ryu GW, Kim Y. (2023) (17).</i>	To show the latest evidence concerning the characteristics of errors, factors which aid or hinder, and obstacles associated with the rate control of intravenous medications	scoping review	N=22 studies were included	South Korea	Medical error factors are policy and procedures in medical administration and interruption and distractions. It is important to establish effective risk-reduction strategies.

Table 2. Overview of the most frequent intravenous medication errors, causes, and prevention possibilities

Authors, year	Aim	Type of study	Population	Country	Results
<i>Beaudart C, Witjes M, Rood P, Hiligsmann M. (2023) (18).</i>	Investigate ICU nurse's views on the frequency of medication administration errors during continuous infusion therapies	cross-sectional study	N=91 nurses	The Netherlands	The most common errors were the administration of the medication at the wrong time, the administration of a non-prescribed medication, and the wrong infusion rate.
<i>Hertig JB, Degnan DD, Scott CR, Lenz JR, Li X, Anderson CM. (2018) (19).</i>	Compare medication administration errors between ready to administered the product and intravenous administration traditional push practice	observational study	-	The United States	Ready-to-administer products were associated with fewer observed errors than intravenous push traditional practice. The most common medication errors were: disinfection errors, dilution errors, and labeling errors with traditional intravenous push practice.
<i>Lyons I, Furniss D, Blandford A, Chumbley G, Iacovides I, Wei L, et al. (2018) (20).</i>	Determine the prevalence, types, and severity of errors and discrepancies in English hospitals	observational study	N=1,326 patients	England	The most frequent types of deviation errors were rate deviation, unauthorized medication, and administration start time discrepancy. It was found that 1 in 10 intravenous infusions involved an error, and one in two involved a discrepancy.

the results that wrong dosage calculation is a leading error in intravenous administration. Nursing staff recognizes that improving knowledge of dosage calculation can reduce the frequency of errors. Another common error is the wrong rate of administration which happens when administering intravenous medication and leads to dosing errors like overdosing and underdosing (1-12). Dose calculations can be a significant risk to patient safety, and errors can cause complications. Research findings suggest that dose calculation is the most common error (3-14). To prevent this type of error, it is important to double-check the medication and perform a check by the second nurse. Literature suggests that hospital nurses are frequently interrupted during the preparation and administration of medications, which significantly contributes to the occurrence of errors. Most interruptions occur externally by other nurses or patients (5, 6). Interruptions during preparation and administration contribute to errors (9-18). Blandford et al. recognized that patient identification errors were more prevalent in England than in the United States. This error is mostly attributed to the widespread use of barcode administration of medication (3). Research findings reported that the massive workload of nurses due to shortages of working staff is in correlation with the high frequency of medication ad-

ministration errors, particularly dosage calculation and drug preparation. Implementation of new organizational strategies to reduce workload is suggested (12, 13). Aseptic technique failures and inadequate hand hygiene are frequent errors (11). In the study conducted by Hamdan et al., most nurses agreed that handwashing is necessary before drug preparation and administration (15).

Discussion

The results of this research have shown the most frequent types of intravenous medication errors which occur during the stages of preparation and administration: insufficient hand hygiene and not adhering to aseptic mode, dose calculation errors, patient identification errors, adhering to the rules of safe medication administration. Interruptions during medication preparation and heavy workloads of nurses were the most common causes for these errors. The following errors occur mostly because of the lack of nursing staff and big workloads which tend to increase the stress level

of nurses as well as lower their concentration because of the large amount of multitasking which happens on an everyday basis. Heavy workloads of nurses are a big issue because of the lack of healthcare professionals. Healthcare professionals expressed excessive workload as a barrier to safe intravenous medication management practices (13). To administer and prepare the medication nurses must have a lot of skills, patience, knowledge, and concentration. Heavy workloads increase the chances of medication errors because of the need to perform multiple tasks at once which all require a lot of focus and concentration. To prevent these types of errors, there is a need to increase the number of staff working in a shift and the amount of workload per nurse. Massive workloads on nurses, due to shortages of working staff, can cause errors. Almost all nurses find it necessary to improve organization strategies. All of that can lead to errors which have a take on patient safety.

Hand hygiene and aseptic method

Hand hygiene is one of the most common errors which occur during the process of intravenous medication preparation and administration. Hand hygiene is the first step which must be taken before preparing and administering the medication. This is an error which occurs commonly because of many distractions, heavy nurse workloads, and a lack of nursing staff. Hand hygiene errors can happen when nurses do not wash their hands at all, don't wash them adequately, or are not at the right time. Healthcare professionals' hands are the most common transmission route for infections (21, 22). Research findings suggested that hand hygiene and aseptic methods are particularly important and most of the nurses in their studies confirm that. The analyzed literature suggests that there is a need for education and a change in the attitude of nurses toward hand hygiene. After the implementation of training programs, there was an increased adherence to hand hygiene from nurses (22). Furthermore, the literature suggests practices to prevent healthcare-associated interventions through hand hygiene (23).

There has been a relationship established between better hand hygiene and fewer cases of cross infections. Literature suggests that education and adherence to hand washing behavior should begin in the academic institutions because they are optimal environments to encourage good habits and provide skills to become competent for professional life for all student nurses (24).

Dose calculation errors

Intravenous medication administration is an everyday task for nurses which involves knowledge about the medication and its doses. There are different formulas used to ensure safe and correct dose calculations (25). Dose calculation errors happened during the preparation of intravenous medication. The most common dose calculation errors include dilution errors; too much or too little dilutant, wrong dilutant, and the wrong drug. It can occur because of a lack of knowledge, distractions coming from patients and other nurses, and because of the similarity of name and packaging of medications. All nurses must know how to calculate the right dose and which dilutant for medication to use. When calculating a medication dose, it is best to use a calculator or write the calculation down, particularly in a stressful situation (25). This error can be a significant patient safety risk because of the fast absorption of the intravenous medication. Research evidence suggests that dose calculation errors are a common occurrence. To prevent this type of error, it is important to prepare the medication with no distractions, to check the dose by another nurse, and to perform double checking of the medication. The double checking includes the following: checking the name of the medication, the time of order by physician, the amount of medicine prescribed by physician, and the expiration date (3-14). Every medication has instructions on what to dilute and what their use is. Nurses need to be especially cautious when converting different units (26). Research shows that nursing students find dosage calculation difficult. Some of the most common errors which nursing students made were related to unit conversion, more complex concepts such as maximum concentration and minimum dilution, calculating IV infusion rate, infusion time, and the volume of solution in which the drug should be dissolved (27). It was found that 40.6% of second-year students made a mistake when converting units (27). It is important to educate nurses on dose calculations and to perform regular knowledge checks so that patient safety can be improved, and all nurses remain updated with knowledge.

Patient identification errors

Patient safety displays healthcare quality and harmless service through the correct patient identification. Patient misidentification can cause harm to the patient because of incorrect medical diagnosis and treatment (28).

Patient identification must be done before the preparation and administration of the medication. Patient identification errors can occur in different areas, such as drug administration, blood transfusions, and surgeries which result in incorrect diagnoses and treatments (28). The causes for patient identification errors are nurse fatigue, heavy workload, the possibility of having two patients with the identical name, distractions, and lack of patient identification policy such as failure to check the patient's name (28). To prevent this type of error, it is necessary to check on the patient's list what medication and dose must be prepared. Everything that is prepared for the patient must carry a label with their name. Before administration, it is necessary to check if it is the right patient and the right medication. The patient's name is checked by asking them what their name is, never by addressing them by name because patients can confirm even if it is not them. After that, the name given by the patient should be compared with their identification bracelet. Literature suggests that identification errors occur because of the widespread use of barcode administration of medication. It is important to check the patient's name and the name on their wrist bracelet to prevent this type of error and to improve patient safety (2). Wrong patient identification can lead to the wrong medication being administered, which can cause complications and lead to an extended hospitalization. Literature suggests these recommendations to improve identification errors: healthcare professionals need to be educated on the hospital information system, review of the employees' working hours to reduce fatigue, increase the culture of patient safety, and implement a clear policy for patient identification (28).

Not adhering to the rules of safe medication administration

Nurses are responsible for intravenous medication administration and preparation. They are the last person to check what medication is prescribed to the patient, in what dose, by which route of administration, and at what time. To safely apply and prepare the medicine, six rules for the safe use of the medication are distinguished. These rules include the right patient, the right medicine, the right medication dose, the right time of administration, the right administration route, and the right documentation (26). Different hospitals have defined a policy for double-checking, whereby a second nurse verifies, in the presence of the first nurse who

prepared the medication: the medication order, the correct dose for patient weight, time of the last dose administration, medication and diluents when applicable, dose calculation, preparation and patient identification. Independent checking required nurses not to tell each other details about the medication before or during the check, so as not to prime the checker with potentially incorrect information (29). Similarities in the appearance of the medication, unsafe preparation environment, or lack of knowledge and skills can lead to errors such as the wrong dose, wrong diluent, wrong volume, wrong pump setting, and dose omission which puts the patient at risk. To prevent these errors, it is necessary to educate nurses and increase their knowledge about different medications, especially when two medications are similar in appearance and packaging. It is important to provide continuous education for nurses to increase their knowledge and skills. Reporting medication errors is the first step to raising awareness and preventing them from occurring again (4,18-20). Nurses should never administer a medication which they have not prepared by themselves. The medication always needs to be prepared by the same nurse who is administering it. Before the preparation, nurses need to perform adequate hand hygiene, use personal protective equipment (gloves, mask, eyeglasses) depending on the medication, perform the six checks, plan the administration intervention, and avoid distractions. While preparing the intravenous medication, an aseptic environment and safe pulling up of the medication from the vial or ampule must be ensured. Before pulling up the intravenous medication with a needle and syringe, the name, dose, and route of administration must be verified. The patient always needs to be informed about the medication uses and possible side effects (26). Before the medication administration, the nurse always must inform the patient about the signs and symptoms of side effects. It is also important to check if the patient understood everything the nurse informed them about. After the medication administration, the nurse has to monitor the patient's condition in case of changes in the condition, disturbance of the vital signs, and the occurrence of adverse reactions, and if any of these happen, the nurse should notify a doctor immediately (26). Every step and change in the patient's condition has to be documented. Documentation is an important part of nurse work and needs to include: the name of the administered medication, dose of the administered medication, route of administration, time of administration, patient condition, interventions done,

occurrence of adverse reactions, methods of patient education about the medication and recommendations about future care plan (24). Prescribed medication must be administered at the right time because of its therapeutic effect.

Interruptions during medication preparation

Errors during the preparation and administration of the drug, as well as during other nursing interventions often occur because of distractions. Most hospitals use different devices to reduce different types of medical errors. Devices alert healthcare workers if something is not as it should be. Most of the errors happen because there are too many alarms. Furthermore, these devices can be a distraction and must be used with care (30). Distractions like devices, noises, and questions from patients and healthcare workers are the main causes of these types of errors (10). Also, medications are often administered under challenging conditions, which creates opportunities for distractions and interruptions (31). In order to prevent that, it is necessary to ensure a safe environment to prepare the medication and only use the devices which are necessary for patient care and health. It is necessary to support a multifactorial approach to reduce errors. Only one nurse should prepare and administer the medication. A second nurse can help and double-check the medication which is prepared to increase patient safety and reduce the harm which can be caused if the wrong medication is administered. Literature suggests that interruptions during preparation and administration contribute to errors, but that there are also fewer interruptions happening in the evening. It also suggests that the number of distractions is seemingly larger before the administration and during the process of preparation than after the administration of the medication. It is necessary to reduce the number of distractors to ensure better and highest quality in the preparation and administration of the drug for the patient and to improve their health condition (32).

Limitations and strengths

Limitations of this review were that only the articles which were full free version available and in the English language were used. Another limitation was that PubMed, Scopus and ScienceDirect databases were searched. This review is based on new literature from the period 2018-2024.

Conclusion

Intravenous administration as a common nursing intervention is prone to high error rates. Nurses bear a significant amount of responsibility regarding the right way of administration and preparation of intravenous medicine. According to this review, several actions are more prone to be the cause of medication administration errors, and those include the lack of nurse knowledge, heavy workload attitude and behavior, as well as several distractions while preparing the medication coming from other nurses and patients. The outcomes of these actions are the most common intravenous medication errors which include: insufficient hand hygiene and not adhering to aseptic mode, dose calculation errors, patient identification errors, not adhering to the rules of safe medication administration. This literature review gave an insight how to create possible strategies for preventing errors during intravenous medication administration.

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NAJČEŠĆE POGREŠKE I UZROCI POGREŠAKA U INTRAVENSKOJ PRIMJENI LIJEKOVA: PREGLED LITERATURE

Sažetak

Uvod. Intravenska primjena lijeka ključna je komponenta zdravstvene skrbi koja se upotrebljava za primjenu lijekova izravno u krvotok kako bi se postigli trenutačni terapijski učinci. Iznimno je važno osigurati da ovaj način primjene lijekova bude siguran i učinkovit.

Cilj. Cilj je ovog pregleda literature identificirati najčešće pogreške pri intravenskoj primjeni lijekova i njihove uzroke.

Metode. Istraživanje je provedeno u ožujku 2024. upotrebom baza podataka PubMed, ScienceDirect i Scopus koja je uključivala razdoblje od veljače 2018. do siječnja 2024.

Rezultati. Ovaj pregled literature uključuje 17 članaka. Ovi su članci odabrani kako bi se prikazale najčešće pogreške pri intravenskoj primjeni lijekova, njihovi uzroci i mogućnosti prevencije. Rezultati su pokazali najčešće vrste pogrešaka pri intravenskoj primjeni lijekova koje se javljaju tijekom faza pripreme i primjene: higijena ruku i aseptični način, pogreške u izračunu doze, pogreške u identifikaciji pacijenta, pridržavanje pravila sigurne primjene lijekova, distrakcija, radno opterećenje medicinskih sestara.

Zaključak. Intravenska primjena lijeka česta je intervencija u sestrinstvu koja je sklona čestim pogreškama. Medicinske su sestre odgovorne za pravilnu primjenu i pripremu intravenskih lijekova. Prema našem radu, uočeno je više pogrešaka u primjeni nego u pripremi lijekova; što uključuje nedostatke u znanju,

stavovima i ponašanju medicinskih sestara, izostanak higijene ruku te različite distrakcije tijekom pripreme lijekova od strane drugih medicinskih sestara i pacijenata. Navedeni su postupci uzroci najčešćih pogrešaka pri intravenskoj primjeni lijeka, koje uključuju pogrešnu dozu i pogreške u označavanju.

Ključne riječi: intravenska primjena lijekova, pogreške u primjeni lijekova, medicinske sestre
