

MEDICATION ADMINISTRATION ERRORS: EVIDENCES AND IMPLICATIONS FOR PATIENT SAFETY

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ABSTRACT: The objective is to identify the evidences and implications of medication administration errors for patient safety. An integrative review was undertaken through a search in four databases in May 2015. A sample of 40 articles was obtained, submitted to descriptive statistics. Descriptive studies of evidence level 4 were predominant (n=28; 70%), published in Brazil (n=17; 42.5%). The following errors stood out: dose errors (n=27; 67.5%), wrong drug (n=25; 62.5%); wrong patient (n=21; 52.5%); wrong time (n=20;50%); wrong route (n=17;42.5%), besides documentation errors, omission of justifications when necessary and others. This type of event is responsible for causing irreparable damage to the patient or even death.

DESCRIPTORS: Medication errors; Patient safety; Nursing.

ERROS NA ADMINISTRAÇÃO DE MEDICAMENTOS: EVIDÊNCIAS E IMPLICAÇÕES NA SEGURANÇA DO PACIENTE

RESUMO: O estudo objetiva identificar as evidências e as implicações dos erros na administração de medicamentos na segurança do paciente. Trata-se de uma revisão integrativa, com busca dos estudos em quatro bases de dados, em maio de 2015. Obteve-se uma amostra de 40 artigos e foram submetidos à estatística descritiva. Houve predomínio de estudos descritivos – nível de evidência 4 (n=28; 70%), publicados no Brasil (n=17; 42,5%). Quanto aos erros, destacaram-se: erro de dosagem (n=27; 67,5%), medicação errada (n=25; 62,5%); troca de paciente (n=21; 52,5%); erro de horário (n=20;5 0%); via errada (n=17;42,5%), além de erro documental, omissão de justificativas quando necessário e outras. Este tipo de evento é responsável por deixar sequelas irreparáveis nos pacientes ou até levar à morte.

DESCRIPTORIOS: Erros de medicação; Segurança do paciente; Enfermagem.

ERRORES EN LA ADMINISTRACIÓN DE MEDICAMENTOS: EVIDENCIAS Y IMPLICACIONES EN LA SEGURIDAD DEL PACIENTE

RESUMEN: La finalidad del estudio es identificar las evidencias y las implicaciones de los errores en la administración de medicamentos en la seguridad del paciente. Se trata de una revisión integradora con búsqueda de estudios en cuatro bases de datos en mayo del 2015. Fue encontrada una muestra de 40 artículos, sometidos a la estadística descriptiva. Predominaron estudios descriptivos – nivel de evidencia 4 (n=28; 70%), publicados en Brasil (n=17; 42,5%). Entre los errores se destacaron: error de dosificación (n=27; 67,5%), medicación equivocada (n=25; 62,5%); cambio de paciente (n=21; 52,5%); error de horario (n=20;5 0%); vía equivocada (n=17;42,5%), además de error documental, omisión de justificativas cuando necesario y otras. Este tipo de evento es responsable por dejar secuelas irreparables en los pacientes o incluso llevar a la muerte.

DESCRIPTORIOS: Errores de medicación; Seguridad del paciente; Enfermería.

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● INTRODUCTION

In 2004, the World Health Organization founded the World Alliance for Patient Safety, a program that rests on the establishment of safe health care, based on the Member States' public policy development⁽¹⁾.

The Ministry of Health defined the term Patient Safety (PS) in Decree 529 on April 1st 2013 as the "reduction of risk of unnecessary harm associated with health care to an acceptable minimum". This harm refers to the commitment of human structures or organic functions, whether physical, social or psychological⁽²⁾.

The decree institutes the National Patient Safety Program (PNSP), which intends to contribute to high-quality care delivery in Brazilian health services. In this context, six basic PS protocols have been developed, implemented in the PNSP: patient identification; effective communication among health professionals; safety in drug prescription, use and administration; safe surgery; hand washing; minimizing risk of falls and pressure ulcers⁽²⁾.

Among the abovementioned protocols, in this study, Medication Administration (MA) is emphasized, a complex action involving different health professionals that should be performed safely, with a view to valuing the quality of this technique, in order to reduce the occurrence of possible Adverse Events (AE)⁽³⁾.

Thus, the AE refer to avoidable incidents that cause problems for the patients. These errors are frequent in health services and generally imply severe consequences for the patient and/or the professional. Due to this reality, the AE represent a public health problem^(2,4).

Hence, safe care with regard to MA requires that the professionals have solid knowledge, based on the specific scientific literature concerning the intrinsic aspects of drugs and their administration, such as: medication reactions and administration techniques, respectively. In addition, this procedure demands responsibility and attention in the health professionals' accomplishment of all phases of this process, especially involving the nursing team, being the main responsible for this practice⁽⁴⁾.

In view of the above, medication administration is fundamental for PS. Therefore, discussing this theme in research is fundamental with a view to the publication of studies that support evidence-based practice, in search of safe and high-quality care. Therefore, the following research question was elaborated: what aspects are discussed in the scientific literature on medication administration errors?

In that sense, the objective in this study was to identify the evidence and implications of medication administration errors in patient safety.

● METHODS

An integrative literature review was undertaken, which corresponds to the synthesis of background studies and mainly describes the conclusions from the literature corpus about a specific phenomenon, executed in five phases: 1) formulation of the research problem, establishment of review objectives and selection criteria to include articles; 2) definition of the variables to be extracted from the publications; 3) selection and assessment of articles in the databases; 4) analysis of results; and, 5) discussion and presentation of the data⁽⁵⁻⁶⁾.

To guide the search for the articles in the databases, a protocol was elaborated that consisted of the following topics: theme; objective; guiding question; data collection strategy; eligibility criteria of the studies; data to be collected for critical review of the studies; synthesis and analysis of the data.

The search for the studies was undertaken in the databases Latin American and Caribbean Health Sciences Literature (LILACS), National Library of Medicine (PubMed Central), Scopus Info Site (SCOPUS) and Nursing Database (BDENF), in May 2015.

To appropriately refine the selected studies, a sample was defined according to preset inclusion criteria: articles whose full text was available free of charge in the abovementioned databases, without any time limit, provided that the articles answered the research question. Publications on MA in

children and infants and studies in the form of editorials, letter to the editor, theses, dissertations, opinion articles and other integrative literature reviews were excluded.

Articles from LILACS and BDEF were included based on the use of the descriptors indexed in the Descritores em Ciências da Saúde (DeCS): Erros de Medicação, Segurança do Paciente e Enfermagem. In PUBMED and SCOPUS, the descriptors indexed in the MeSH – Medical Subject Headings vocabulary were used, in English: Medication Errors, Patient Safety and Nursing.

Those descriptors were crossed using the Boolean operator AND and an uncontrolled search was undertaken in the abovementioned databases. In addition, the search resource “ ” was used to limit the research to the adjacent terms in the articles found. Thus, the search strategies used in the databases are displayed in Figure 1.

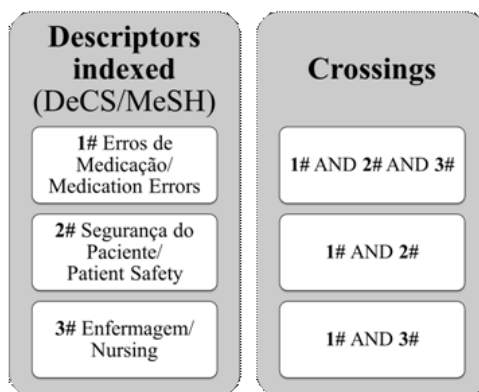


Figure 1 - Descriptors and strategies to search for articles in the databases. Natal, RN, Brazil, 2015

After the search process for the studies in the databases, the publications were preselected based on the reading of the titles and abstracts. Then, the full versions of the preselected articles were read and, finally, the publications were selected for inclusion in the final research sample.

Table 1 displays the selection process of the studies, corresponding to the number of articles found in each database and the sample of preselected studies for full reading, according to the search strategies used in the electronic databases.

Figure 2 displays the flowchart of the selection process of the articles for inclusion in the final study sample, according to the selection phases of the publications.

To collect the data, a tool was used the researchers had elaborated and applied in earlier studies with the same design, considering the following variables: databases; article title; country of study; language; publication year; setting (hospital or primary care); if hospital, what sector; methodological design (type of study); evidence level; description of MA error.

The scientific evidence from the articles analyzed was classified in line with the evidence levels recommended by the Joanna Briggs Institute⁽⁷⁾, that is: level 1 –systematic reviews and randomized

Table 1 – Distribution of selection process of articles. Natal, RN, Brazil, 2015

Database	Research result			Preselected studies*
	1# AND 2# AND 3#	1# AND 2#	1# AND 3#	
	n	n	n	
LILACS	20	31	80	29
PUBMED	56	337	190	18
SCOPUS	216	463	101	29
BDEF	11	14	66	10
TOTAL	303	845	437	86

*Studies selected for full reading according to eligibility criteria.

clinical trials; level 2 –systematic reviews of quasi-experimental studies, quasi-experimental controlled prospective studies and retrospective studies with controlled group; level 3 –systematic reviews involving cohort studies, cohort studies and case-control studies; level 4 –systematic reviews of descriptive studies, sectional studies, case series and case study; level 5 –systematic reviews of expert opinion, expert consensus and research bases or opinion of a single expert.

Finally, after the skimming and critical analysis of the selected articles, the results were typed in electronic worksheet in Microsoft Excel 2010®, analyzed using descriptive statistics and presented as Pictures and Tables.

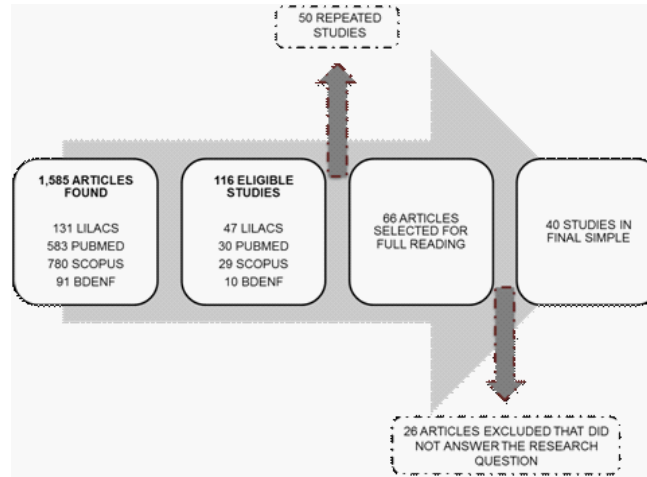


Figure 2 – Flowchart of article selection process. Natal, RN, Brazil, 2015

● RESULTS

The study sample consisted of 40 articles, characterized as described in Picture 1, according to the country where the study was published, the study design, with its respective references, and the classification of the evidence level.

Picture 1 – Characteristics of studies included in final research sample. Natal, RN, Brazil, 2015

Country	Study design	Evidence level
Brazil (n=17;42.5%)	Observational	3
	Descriptive	4
Australia (n=3;7.5%)	Observational	3
	Descriptive	4
Belgium (n=1;2.5%)	Observational	3
South Korea (n=1;2.5%)	Descriptive	4
United States (n=6;15%)	Observational	3
	Descriptive	4
Finland (n=1;2.5%)	Descriptive	4
Iran (n=2;5%)	Descriptive	4
Ireland (n=1;2.5%)	Descriptive	4
Israel (n=1;2.5%)	Descriptive	4
Singapore (n=1;2.5%)	Descriptive	4
Canada (n=2;5%)	Experimental	2
	Descriptive	4
China (n=1;2.5%)	Experimental	2
France (n=1;2.5%)	Observational	3
The Netherlands (n=1;2.5%)	Observational	3
England (n=1;2.5%)	Systematic review	1

As shown in Picture 1, studies executed in Brazil were predominant (n=17;42.5%), followed by the United States (n=6;15%). Among the study designs, descriptive studies stood out – Evidence level 4 (n=28;70%), as well as observational studies – Evidence level 3 (n=9;22.5%).

Table 2 displays the distribution of the error types in the MA process according to the corresponding descriptive statistics (n and %).

According to Table 2, it was observed that the largest number of MA errors is related to the dose (n=27;67.5%), followed by medication errors (n=25;62.5%). The errors related to the volume administered and professionals' distraction during the drug administration were reported in only one article (2.5%) though.

Table 2 – Distribution of error types in the publications analyzed. Natal, RN, Brazil, 2015

Error type	N	%*
Wrong dose	27	67.5
Wrong medication	25	62.5
Wrong patient	21	52.5
Wrong time	20	50
Wrong route	17	42.5
Documentation error	16	40
Omission in medication administration	14	35
Wrong technique	13	32.5
Non-observation of possible medication reactions by professionals	6	15
Wrong speed	4	10
Overdue drug	2	5
Wrong volume	1	2.5
Distraction during administration	1	2.5

*The percentage (%) was calculated based on the total number of articles analyzed (n = 40)

● DISCUSSION

Based on the results, it was observed that adverse events in health resulting from MA are a global concern, although the Brazilian context is highlighted. Nevertheless, the concentration of studies published in Brazil can be related to the characteristics of the databases elected in the electronic search.

In addition, it was observed that descriptive studies (n=28;70%)⁽⁸⁻³⁵⁾ published in Brazil (n=17;42.5%)^(8-22,36-37) were predominant in this research. In that sense, despite the propensity to consider descriptive studies as “smaller” studies or of restricted use, as they could not underlie any kind of inference, they can be an extremely important management tool in health systems, providing substantial contributions to evidence-based practice⁽³⁸⁾.

Nevertheless, descriptive studies are classified under evidence level 4⁽⁷⁾, representing low reliability with a view to generalization of the data and practical application. Therefore, investments in experimental studies are recommended (evidence level 2)⁽⁷⁾ to enhance the credibility for use in care and health care management.

It is highlighted, however, that the choice of a certain approach in the attempt to answer a given research problem or hypothesis should always take into account the researcher's reality, the available resources and the applicability of these results in practice⁽³⁸⁾.

Thus, it is noteworthy that the quality and methodological approach of the studies directly influence the applicability of the nursing professionals' praxis in health services with regard to PS in the medication administration process.

It is known that MA is one of the main tasks of the nursing team and this reality demands considerable knowledge on this theme, with a view to contributing to PS in the practice of this procedure, so as to deliver care free from malpractice, negligence and imprudence. Hence, the nurse is responsible for planning nursing actions to minimize the patient damage resulting from MA errors⁽³⁹⁾.

In this interval, authors⁽⁴⁰⁻⁴¹⁾ describe possible causes for the occurrence of MA errors, that is: work overload, associated with the intense work routine and low remuneration; lack of attention of professionals; inexperience in care practice, generally referring to the deficient education some teaching institutions offer; and inappropriate structure offered by health services.

Among the types of MA errors found in this review, the main refers to the medication dose, present in 27 studies (67.5%)^(8,10-11,13-14,16-17,19-20,23-28,30-32,34,36,42-49). In line with this finding, one study⁽⁵⁰⁾ that was aimed at identify the profile of medication preparation errors found that 67.7% of the errors were associated with doses prepared wrongly.

In this context, for the nursing team to administer the correct dose, the professional needs to know the drug, its components and certify if the prescribed drug lies within the known dose interval. In addition, it is fundamental for the nursing professionals to be knowledgeable on drug calculation, which should be carefully execute so as not to cause wrong dose errors⁽⁵¹⁾.

According to data published by the São Paulo Regional Nursing Council (COREN-SP), associated with the Brazilian Network of Nursing and Patient Safety (REBRAENSP), the two most frequent MA errors in health services are wrong drug and wrong patient⁽⁵²⁾. The same reality was found in this research, in which the administration of the wrong drug was the second most common error among the studies analyzed, being present in 62.5% (n=25)^(8-11,13,16,20-21,23-26,28-31,36-37,42-43,45-46,48-49,53) of the sample, followed by the administration of drugs to the wrong patients (n=21;52.5%)^(8-11,16,18,22,23-28,30-31,33-34,36-37,46-47).

To minimize this type of event, the importance of health professionals' verifying the patients' identity before any procedure is emphasized. The use of signs identifying the patient in places visible to the team and identification wristbands also stand out as measures to prevent MA errors⁽²⁰⁾.

Concerning the prescribed time, it should be considered that the drug should be administered at the right time to guarantee the therapeutic serum levels⁽⁵⁴⁾. This study showed, however, that 50.0% (n=20)^(9-10,12-17,20,23,42,25,27,30,34,36-37,47-49) of the MA errors are associated with wrong hours.

In that context, it is highlighted that the professional should respect the correct time to administer the drug, without exceeding the limit of thirty minutes after the time set. In that case, the bioavailability of the drug will be affected⁽⁵⁴⁾.

Nevertheless, the main error factor affecting the medication administration at the correct time is related to the lack of available human resources at the health institutions, a reality linked to the professionals' overburden of work^(41,51).

What MA through the wrong route is concerned, this research demonstrated that 42.5% (n=17)^(8-11,13,16,18,21-23,25,27,30-31,36-37,42) of the articles analyzed discussed that type of error. Route errors are frequent at hospital services around the world and it is known that these situations can result in severe AE for the users, including death⁽⁵⁵⁾.

In that sense, researchers⁽⁵⁵⁾ found that the items on the medical prescription can considerably contribute to the route errors. In the study cited, it was verified that 91.3% of the prescriptions contained non-standardized abbreviations, 22.8% did not contain user data and 4.3% did not present data and contained erasures. These documentation errors contribute substantially to the MA errors, including route, patient, dose and drug errors, causing severe sequelae and even patients' death.

In addition, correct notes in the nursing records are important and should be made after the MA. Making these notes before the MA is a risk, as the patient can reject the drug. Also, forgetting to register can cause a new administration of the drug by another professional, resulting in damage and health problems for the patient⁽⁵¹⁾. Despite this fact, this study found that 40.0% (n=16)^(10,12,21-22,24-25,27-31,33,35-36,43,56) of the articles analyzed discussed documentation errors in the MA process.

Consequently, it is suggested that, during the drug preparation, nursing professionals could use

the identification of each drug with adhesive labels as a way to prevent errors, including the bed, the patient's name, drug, dose, administration route and time. After the MA, it is fundamental to check the medication and justification in case the professional did not administer the drug⁽⁵¹⁾.

Thus, without a justification for the non-administration of the prescribed drug in the patient's documentation, the act will be characterized as omission. In this research, it was evidenced that 14 (35.0%)^(13-15,17,19-20,23-24,36,44-45,47-49) studies discussed this type of error.

After finishing the drug administration, the professional should monitor the patient for possible adverse reactions and verify if the patient is responding as expected. In this respect, the professional should be knowledgeable on the drug's action and be able to distinguish it from the adverse events⁽⁵¹⁾. Despite this recommendation, in this review, six (15.0%)^(11,26-27,30-31,33) publications referred to professionals' non-observation of drug reactions in the patients.

Nursing professionals possess legal and technical skills to prepare and administer medication. Nevertheless, the basic requisites should be observed that guarantee the absence of damage for the patient, in compliance with the Ethics Code of Nursing professionals⁽⁵⁷⁾.

In this sense, researchers^(37,51,54) are interested in understanding the factors leading to errors and preventive measures, looking for strategies to be implemented in the health services with a view to minimizing AE related to the drug preparation and administration, such as: double checking of the prescription; certification of nine rights; error reporting; support from electronic systems; effective registration system; unit dose; continuing education for professionals; well-structured physical environment and good work organization.

Although the articles analyzed skillfully answer the research question, this study came with the following limitation: most publications are descriptive and are therefore ranked under low evidence levels, making it difficult to apply the results in the health services' practice.

● CONCLUSION

The analysis of the selected studies revealed that, despite the existence of countless publications on the theme, deficiencies in the methodological quality are still noteworthy with a view to the application of the produced knowledge in practice. Most studies are descriptive and, consequently, rank under low evidence levels. This reality reflects the need for further investments in experimental research to enhance the reliability of the publications for the sake of application in evidence-based practice.

In addition, among the articles include in the final sample of this review, wrong dose and drug, wrong patient and wrong time were the most recurring errors in the MA process at the health services. The large number of studies on the theme indicates the strong concern of researchers, health professionals and managers with this type of event. After all, these incidents are responsible for causing irreparable damage and even death.

Therefore, it is fundamental for the health professionals to periodically seek qualification and recycling with a view to minimizing the adverse events deriving from this procedure, in order to contribute to safe and high-quality care.

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