

Original Paper

Scenery of brazilian studies on medication errors: an integrative review

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Abstract

The objective of this integrative review was to identify studies conducted in Brazil that address the occurrence of medication errors in a hospital environment. A integrative review was conducted with national observational studies which analyzed the occurrence of errors related to medication in the hospital environment. 1028 articles were found, of which only 23 (20.4%) studies met the eligibility criteria and were included in the review. Among the professional classes most investigated in medication errors are nurses (44.8%), followed by physicians (24.1%), nursing technicians (17.2%) and pharmacists (13.9%). The most prevalent medication errors are those related to dose (18.0%), omission (15.7%), time of administration (11.2%) and prescription (11.2%). The strategies of investigation of errors used in the Brazilian hospital systems do not always cover all professionals involved in the medication process. It is necessary that professionals work in an interdisciplinary way, aiming at the safety and well-being of the patient.

Key words: Medication Errors, Review, Accident Prevention, Patient Safety.

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Panorama dos estudos brasileiros sobre erros de medicação: uma revisão integrativa da literatura

Resumo

O objetivo desta revisão integrativa foi identificar estudos realizados no Brasil que abordam a ocorrência de erros de medicação em ambiente hospitalar. Realizou-se uma revisão integrativa entre os estudos observacionais nacionais que analisaram a ocorrência de erros relacionados à medicação no ambiente hospitalar. Foram encontrados 1028 artigos, sendo 23 estudos (20,4%) incluídos na revisão por preencherem os critérios de elegibilidade. Dentre as classes profissionais mais envolvidas nas investigações, se encontram os enfermeiros (44,8%), seguidos de médicos (24,1%), técnicos de enfermagem (17,2%) e farmacêuticos (13,9%). Os erros de medicação relacionados à dose (18,0%), omissão (15,7%), ao horário de administração (11,2%) e à prescrição (11,2%) foram os mais prevalentes. As estratégias de investigação de erros utilizadas nos sistemas hospitalares brasileiros nem sempre abrangem todos os profissionais envolvidos no processo de medicação. Diante disso, percebe-se a necessidade de as equipes de saúde trabalharem de maneira interdisciplinar, visando a segurança e bem-estar do paciente.

Palavras-chave: Erros de Medicação, Prevenção de Acidentes, Segurança do Paciente.

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Introduction

The World Health Organization (WHO) defines an adverse event as any incident that results in impairment to the patient. In recent years, given the impact and relevance generated by such events, patient safety in a hospital environment has become a central concern. Within this context, topics that pose an important and significant risk to the patient's health and safety are concentrated, standing out among them medication errors.¹

The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) defines a medication error as "any preventable event that may cause or induce the inappropriate use of medication or impairment to the patient while the medication is under the control of the health care professional, patient or consumer".² Such practice results from unintentional action, caused by some problem or failure during the patient's care event, and may occur at any stage of drug therapy, from prescription to administration of the drug to the patient.³

In this context, in 2017 the WHO launched the global challenge to reduce by 50% the serious and preventable impairments associated with medicines in the following five years, with the aim of addressing the weaknesses in health systems that cause medication errors and the serious harm related to those events.¹ Similarly, in Brazil, government initiatives have been directed towards patient safety, such as the institution of the National Patient Safety Program (Programa Nacional de Segurança do Paciente, PNSP) by the Ministry of Health, with the objective of contributing to the qualification of health care in all establishments in the country, both public and private.⁴

In Brazil, reviews on medication errors in hospital settings are still scarce and incipient. Studies investigating medication errors restricted the search to the occurrence of the event in nursing teams^{5,6} or assessed the incidence of only one type of error, such as dispensing⁷ or administration errors.⁸ In this sense, this work is relevant since it presents a more comprehensive methodology for research on the subject. This review sought to identify studies conducted in Brazil on the occurrence of medication errors in hospital settings.

Methods

Study design and eligibility criteria.

An integrative review was carried out for qualitative synthesis of observational studies conducted in Brazil, in English or Portuguese, which analyzed the occurrence of medication-related errors in the hospital settings, published between January 2010 and December 2015. Qualitative studies, review articles, letters to the editor, comments, editorials, books, end-of-course papers, dissertations, theses, specializations, abstracts published in congress annals or scientific journals were excluded.

Source of information and search strategy

The articles were selected from a search strategy in the Virtual Health Library (*Biblioteca Virtual em Saúde*, BVS) and Google Academic databases. Studies carried out in Brazil that related medication errors to the hospital environment were selected, published in English or Portuguese. The search strategy used the descriptor "medication errors". The search took place on August 20th, 2016, and was conducted by two authors independently in order to avoid the presence of bias in the selection and exclusion of studies. After the identification of the articles, a crossover of the articles was carried out in order to remove duplicate publications.

Titles, abstracts, and keywords were read to assess which articles met the inclusion criteria. Subsequently, the articles included were read in their entirety to apply the exclusion criteria.

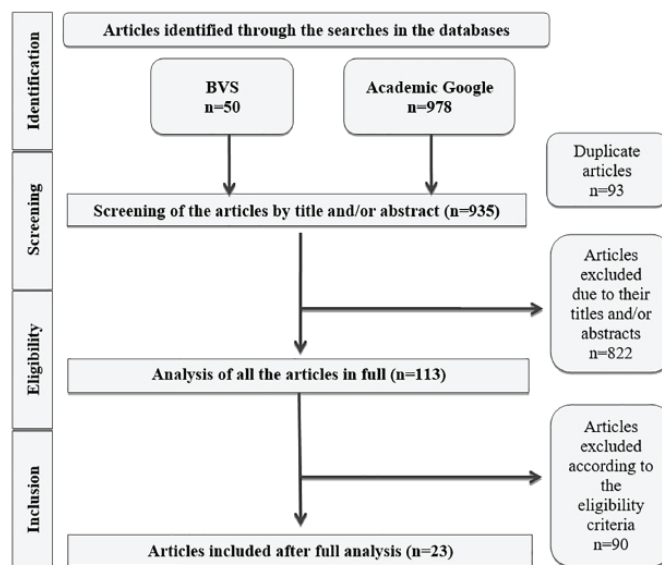
The variables collected and analyzed were the following: year of publication, study design, information source, study period, environment, professionals involved, main results and measures adopted after error detection.

The information analyzed has been systematized into a descriptive table.

Results

From the search strategy, a total of 1,028 articles were identified, of which 93 (9.1%) were duplicated. After analysis of the 935 remaining articles, 113 (12.1%) were selected from the title and abstract for a full reading. After a full analysis of these articles, 23 (20.4%) met the eligibility criteria and 90 (79.6%) were excluded. Details of the selection process are shown in Figure 1.

Figure 1. Flowchart of the articles' selection phase.



Source: Flowchart of the selection of the articles.

Of the 23 studies analyzed, 13 (56.5%) were descriptive^{6,12-23} and 10 (43.4%) were cross-sectional analytical studies.²²⁻³¹ Regarding the sources of information to identify the error, in seven works (30.4%) direct observation was used to collect the data^{11,15,21,27,29-31}; in four (17.4%) error notification analysis was applied^{9,17,18,25}; in four studies (17.4%) analysis of prescriptions was performed^{13,22,26,28}; three articles (13.0%) took advantage from questionnaire data^{14,16,23} and another three (13.0%) resorted to record books and nursing interferences.^{10,12,19} In two studies, a mixed source of information was used and, in addition to direct observation, one work applied notification analysis²⁴ (4.4%) and another, prescription analysis²⁰ (4.4%).

Among the studies, the main hospital units investigated were the medical clinic^{3,18-20,30,32,33} and intensive care unit,^{5,13,16,20,30,34,35} followed by surgical,^{17,29,30} oncology clinics,^{17,26} emergency room,^{10,17} ambulatory,¹⁷ nursery,¹⁷ infirmary,²⁰ hospital pharmacy,²⁸ maternity,¹³ multi-use intensive care unit,¹⁸ and renal therapy unit.¹⁷ In seven works (30.4%) the investigated hospital area was not specified.^{9,14,16,22-25} Regarding the data collection period, the shortest time was 15 days²⁸ and the longest, 6 years.⁹

The professionals most involved in the investigation of medication errors were nurses (44.8%),^{9,12,14-21,23,26,29} physicians (24.1%),^{13,14,18-20,22,25} nursing technicians (17.2%),^{14,17,20,27,30} and pharmacists (13.9%).^{14,25,28,30}

Among the medication errors described, 18.0% were related to dose error, that is, the administration of a higher or lower dose than prescribed, administration of an extra dose of the drug or administration of a double dose of the drug,^{6,12,14,16-23,26,27,29-31} and 15.7% to omission errors, this being the non-administration of a medication prescribed for the patient or the absence of its registration.^{12-14,16,18,20,21,23,25-28,30,33} Errors related to administration time^{10,11,14,19,21,24,25,28-30} and prescription^{10,13,14,18-22,25,31} corresponded to 11.2% each; those involving wrong administration^{10,16,18,21,23-26,28} and administration technique^{10-12,17,18,21,23-25} added up to 10.1% each; and the errors observed in the therapeutic scheme,^{9,15,17,20,23,29,31} the preparation of medications^{9,15,16,25,27-29} and the route of administration^{15-17,20,21,23,24} corresponded to 7.9% each.

Among the studies evaluated, the majority (56.5%) did not report actions implemented after the identification of medication errors.^{6,15,16,18,20-24,26,28,31,32} In the other studies, (43.5%), the guidance to professionals involved in the error and the implementation of educational measures were described.^{9,11,14,16,23,25,29,31} Besides this action, two studies also mentioned the implementation of meetings with the professionals or sectors involved^{14,23}; and one paper described the use of a warning as an additional preventive measure.¹⁶

Additional information on the selected studies is detailed in Table 1.

Table 1. Information on the selected studies addressing medication errors, according to inclusion criteria (n=23) (Continue)

Study design	Place of study and year of publication	Information source	Study period	Environment	Main results found	Measures adopted after detecting the error
Cross-sectional, analytical or exploratory	Pelotas, RS. 2015. ²²	Analysis of the prescriptions.	From June to November 2014.	Small size hospital.	The following errors were observed: incomplete posology; absence of pharmaceutical form; the presence of abbreviations, codes, and acronyms; absence of age, hospitalization unit, concentration, professional's stamp, and bed.	Not described.
	Multi-center. 2015. ³¹	Non-participating systematic observation during the administration of drugs and newborn records.	From 2002 to 2012.	Neonatal intensive care unit.	Management errors were the most frequent. Errors of incorrect administration technique and time were also identified.	Not described.
	São Paulo, SP. 2015. ²³	Questionnaire.	August and September 2013.	State public hospital of secondary level.	Errors of time and different patients on the same tray were described; also the occurrence of parallel conversations during preparation; failures related to biosecurity norms; wrong time of administration; and dosage omission.	Not described.
	São Paulo, SP. 2014. ²⁴	Notification forms and patient records.	From January to March 2012.	Private network's General Hospital.	The main medication errors detected were omission and time.	Root cause analysis teams identified the recommendations, based on best practices.
	Porto Alegre, RS. 2013. ²⁵	Error notification.	From 2010 to 2011.	Clinical hospital.	The most frequent type of error was that of prescription. In the 114 notifications of medication errors identified, 122 medicines were cited.	Not described.
	João Pessoa, PB. 2012. ²⁶	Medical prescriptions.	From August to October 2010.	Oncological hospital.	Dispensing errors, errors related to higher and lower than necessary doses, the omission of dose, wrong dispensed drug (another drug) and the wrong dispensed drug in the wrong pharmaceutical form were the most frequent.	Not described.
	Rio de Janeiro, RJ. 2012. ²⁷	Observation in grinding, mixing and dilution.	March 2010.	Intensive care unit of a private hospital.	The errors were grouped into the categories dilution and mixing for liquid forms.	Not described.
	Salvador BA. 2012. ²⁸	Prescriptions.	Every fortnight, in two moments: August 2009 and July 2012.	Hospital pharmacy.	The most prevalent errors were those of omission and concentration.	The pharmacists avoided the administration of contraindicated drugs to patients.
	Rio de Janeiro, RJ. 2012. ³⁰	Observation.	From January to August 2008.	Intensive care unit, medical and surgical clinic.	The most frequent errors were the following: not checking medication; not assessing catheter permeability; not evaluating the presence of phlebitis; delayed drug administration.	Training of all the technicians.
Jacarepaguá, RJ. 2011. ²⁹	Observation of critically ill patients.	January and February 2008.	Intensive Care Unit, medical and surgical clinic.	The most frequent errors were related to needle change, ampoule disinfection, bench cleaning, and wrong time and dose.	Not described.	
Descriptive.	Recife, PE. 2015. ⁹	Notifications filled out by clinical nurses.	From 2007 to 2013.	Quaternary level teaching hospital.	The main type of error was "omission". The main cause of the error was "inattention".	Individual counseling and guidance and routine procedures were conducted.

Table 1. Information on the selected studies addressing medication errors, according to inclusion criteria (n=23) (Conclude)

Study design	Place of study and year of publication	Information source	Study period	Environment	Main results found	Measures adopted after detecting the error
	São Paulo, SP. 2014. ¹³	Analysis of prescriptions.	April 2013.	Teaching pediatric public hospital.	The main errors identified were the following: absence or illegibility of the patients' names; lack of signature and stamp/registration number in the prescriber's class council; dose-related errors.	Not described.
	Midwest region. 2014. ¹⁰	Unit's intercurrent book.	From September 2007 to March 2010.	Emergency room.	The most relevant errors were those related to the omission of care and failure in the notes and/or records in the evolution sheet, highlighting the death as the most serious consequence.	Not described.
	Santa Maria, RS. 2014. ¹⁴	Questionnaire.	October 2011.	Small size general hospital.	Among the interviewees, most say that errors occur rarely, mainly due to inattention in the preparation of the drug.	Orientation, meeting with the working shift group and sector involved, verbal and written warning, review of the working process, suspension.
	Goiás. 2013. ¹¹	Analysis of the drug administration process.	From February to July 2008	Medical clinic unit.	52 failures were identified during the drug administration process, in addition to 79 effects of the failure and 285 causes of failure.	Re-planning and redistribution of the nursing activities and protocol standardization.
	Alfenas, MG. 2012. ¹⁵	Non-participating and direct observations.	Not informed.	Intensive care unit.	Omission, infusion rate, route of administration, dose, dilution, and time errors.	Not described.
	Diamantina, MG. 2011. ¹⁶	Questionnaire.	August 2010.	Charitable hospital.	181 errors were identified, with non-monitoring of the patient after medication being the main type, followed by a non-prior evaluation of the patient.	Orientation and guidance followed by a warning.
	Goiás. 2011. ¹²	Books used by the nursing team and annotation of intercurrents.	From 2002 to 2007.	Medical clinic unit.	230 medication errors were identified, the most frequent being omission; dose; time; and administration technique.	Not described.
	São Paulo, SP. 2011. ¹⁷	Notification sheets.	March and April 2009.	Emergency room, outpatient, medical clinic, surgical clinic, neonatal and pediatric intensive care unit, renal replacement therapy unit, oncology unit, hematology, and nursery unit.	The infusion speed error prevailed (25%). The human factor dimension in the poor performance category (54%) was the most frequent cause of the error.	Involvement of the team in the notification of events, discussing causes in formal meetings, so that preventive actions could be implemented.
	Uberaba, MG. 2010. ¹⁸	Notification sheets.	From March to May 2008.	Multipurpose intensive care unit.	The most frequent errors were omission, dose, and administration.	Notification of errors in some cases.
	Ribeirão Preto, SP. 2010. ¹⁹	Secondary data.	2005.	Medical clinic unit.	Presence of acronyms and/or abbreviations in 96.3% of the prescriptions; absence of patient registration; lack of posology; and omission of date.	Not described.
	Dourados, MS. 2010. ²⁰	Non-participating and direct observation of the drug administration techniques, structured interview and analysis of patients' medical records and prescriptions.	From August 2004 to May 2005.	Intensive care unit and infirmary.	Preparation and administration errors, such as grinding of controlled-release pills, administration of more than one drug at the same time, and association of the drug with the enteral diet.	Not described.
	Ribeirão Preto, SP. 2010. ²¹	Secondary analysis of data obtained in the investigation and analysis of medication errors and direct observation.	2007.	Medical clinic.	A total of 74 medication errors occurred during preparation, the medication administration, dose errors; in relation to time, and administration of unauthorized medication.	Strategies and recommendations were presented to prevent the recurrence of errors.

Discussion

The errors related to the medication process in hospital units are points of constant reflection, and studies aimed at their identification, evaluation, and prevention are necessary for the implementation of safe practices.⁷ In this way, the present study contributes to this national and global effort, presenting an overview of the national scientific evidence on the subject. According to the results identified in this integrative review, we notice that the professional class most investigated in medication errors are the nurses;^{9,12,14–21,23,26,29} the most prevalent medication errors were those related to dose^{6,11–13,15,17,19–23,26,27,29–31} and omission;^{12,13,15–17,19,21,23,25–28,30,33} and a large percentage of the studies do not report any actions implemented in response to the errors, whether they are preventive and/or educational measures.^{6,15,16,18,20–24,26,28,31,32}

Since the publication of Ordinance No. 529³⁶ and the establishment of the National Policy for Patient Safety (*Política Nacional de Segurança do Paciente*, PNSP), a broad discussion on the implementation of measures to ensure patient safety has begun in the country. In this review, most of the studies were conducted before the publication of the Policy^{9–21,24–31} and do not present or discuss the need for preventive and/or educational actions.^{6,15,16,18,20–24,26,28,31,32} It was expected that, after the implementation of the PNSP, the published studies would present a concern about this aspect, highlighting a new look at the error. However, of the 10 articles published after the implementation of Ordinance 529, only four discussed preventive and/or educational measures given the errors observed,^{9,11,14,24} initiating the first results of national discussions aimed at changing the culture of error. The minority of the works pointed out the implementation of guidance to the professionals involved in the error and educational measures or the implementation of meetings with the professionals or sectors involved as measures taken in response to the identified errors.^{9,11,14,16,23,25,29,31}

Another conduct adopted in the face of errors was the use of warning to the professionals involved,^{15,17} a practice not recommended by the PNSP. However, we identified that the two articles describing this punitive measure were conducted before the policy implementation. According to Dalmolin, Rotta and Goldim Jr.,²⁵ during the training, there are not many activities that prepare the professional to deal with the error. The implementation of the PNSP highlights the need to include discussions on patient safety in technical and higher education and encourages a culture for promoting organizational learning, which stimulates and rewards the identification, reporting, and resolution of safety-related problems, including medication errors.³⁷

The data from this work show that the most researched professionals on medication errors in the clinical practice are the nurses.^{9,12,23,26,29,14–21} This fact may be related to the information source most used in the selected works: direct observation,^{11,15,21,27,29–31} followed by error notification analysis,^{9,17,18,25} and analysis of prescriptions.^{13,22,26,28}

The direct observation methodology not only highlights the performance of the nursing professionals, who are directly involved in the preparation and administration of drugs but it also exempts, in a certain way, other professionals who may also be involved in other stages of the medication process. Moreover, the predominance of this investigation method justifies the greater occurrence of errors observed related to drug administration, which involve dosage and omission errors. An alternative method for evaluating medication errors would be notification analysis, as it would be more impartial regarding the professionals involved and the type of error identified. However, a major limitation in the adoption of this method is the under-recording of errors, a condition that can be modified through the implementation of a non-punitive safety culture focused on the analysis of system failures instead of focusing on individual responsibility,¹⁸ as advocated by the PNSP.³⁷

Another tool that makes it possible to evaluate and promote the safety of medication use in health establishments, especially in the hospital environment, is the implementation of the set of three indicators proposed by the PNSP.³⁷ By covering all the stages of the drug use process – prescription, dispensing and administration – these indicators generate information that enables critical analysis and consequent improvements in drug use processes. Besides, they subsidize better conditions for decision making by managers and also involve all the health professionals subject to medication errors.^{38,39}

Finally, it is important to emphasize that the identification and notification of medication errors is extremely important for health systems since it subsidizes the actions to be implemented in order to prevent or mitigate the recurrence of these errors. The publication of the PNSP was a major milestone, but its recommendations need to be effectively implemented in the clinical practice, highlighting the non-punitive culture and aiming, above all, at patient safety.

It is important to stress that this revision has strengths and limitations. The strengths of this review are the structured data collection procedure and the review of the articles by two reviewers. With regard to limitations, it should first be noted that the search strategy used does not guarantee that all the articles related to the topic have been included since the descriptors used may not cover all articles on the topic and there are other databases that have not been used.

Conclusion

The present review showed that the profile of studies on medication errors mostly involves the nursing professionals, and that it is mainly related to the dosage, both of administration and of omission. As a result, it should be noted that most medication errors can be avoided as long as there is a safe system in place to ensure the prevention of such events. However, it is necessary to rethink the strategies for investigating errors used in Brazilian hospital systems in order to cover the professionals involved in all stages of the medication process. Also, there is a need for the professionals and teams to work in an integrated and articulated manner, always aiming at the safety and well-being of the patient.

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Contributors

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Conflicts of interests

The authors declare that there are no conflicts of interest regarding this article.

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