

## NURSING'S RELATIONSHIP WITH MEDICATION ERRORS: AN INTEGRATIVE REVIEW

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**ABSTRACT:** This integrative review aimed to identify in the literature the relationship between medication errors and the nursing team. The study was undertaken by two independent collaborators, in three databases, in the period 2011 – 2015, with 32 studies. The results were divided in two macrocategories: characteristics of the studies, and the direct and indirect relationships between nursing and the medication errors. The direct relationships refer to issues of the professional ambit, such as lack of knowledge and of experience, failures in communication, stress and the distraction of the professionals. The indirect relationships are made up of issues related to prescribing and dispensing, the patient's physical conditions, and errors in the production of the medications. It is concluded that, besides the nursing staff working in administering medications with a view to safe care for the patient, they can act as a barrier to errors arising from other phases of the medication process.

**DESCRIPTORS:** Nursing; Medication Errors; Patient Safety.

### A RELAÇÃO DA ENFERMAGEM COM OS ERROS DE MEDICAÇÃO: UMA REVISÃO INTEGRATIVA

**RESUMO:** Revisão integrativa com o objetivo de identificar na literatura a relação dos erros de medicação com a equipe de enfermagem. A pesquisa foi realizada por duas colaboradoras independentes, em três bases de dados, no período 2011 a 2015, com 32 estudos. Os resultados foram divididos em duas macrocategorias: características dos estudos e as relações diretas e indiretas da enfermagem com os erros de medicação. As relações diretas se referem às questões do âmbito profissional, como a falta de conhecimento e de experiência, falhas na comunicação, estresse e distração dos profissionais. As relações indiretas são compostas por questões de prescrição e dispensação, as condições físicas do paciente e erros na produção dos medicamentos. Conclui-se que, além de a enfermagem atuar na administração de medicamentos com vistas à assistência segura ao paciente, pode atuar como barreira dos erros provenientes de outras fases do processo de medicação.

**DESCRIPTORIOS:** Enfermagem; Erros de Medicação; Segurança do Paciente.

### LA RELACIÓN DE LA ENFERMERÍA CON LOS ERRORES DE MEDICACIÓN: UNA REVISIÓN INTEGRATIVA

**RESUMEN:** Revisión integrativa cuyo objetivo fue identificar, en la literatura, la relación de los errores de medicación con el equipo de enfermería. Se realizó la investigación por dos colaboradoras independientes, en tres bases de datos, en el periodo de 2011 a 2015, con 32 estudios. Los resultados fueron organizados en dos macrocategorías: características de los estudios y las relaciones directas e indirectas de la enfermería con los errores de medicación. Las relaciones directas se refieren a las cuestiones del ámbito profesional, como la falta de conocimiento y de experiencia, faltas en la comunicación, estrés y distracción de los profesionales. Las relaciones indirectas se constituyen por cuestiones de prescripción y dispensación, las condiciones físicas del paciente y errores en la producción de los medicamentos. Se concluye que, además de la enfermería actuar en la administración de medicamentos para una asistencia segura al paciente, puede actuar como barrera de los errores provenientes de otras fases del proceso de medicación.

**DESCRIPTORIOS:** Enfermería; Errores de Medicación; Seguridad del Paciente.

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## ● INTRODUCTION

Medication errors are among the most frequent adverse events in healthcare; the majority could have been avoided in one of the phases of the process of medication (prescription, dispensing and administration). The prevention of these errors is only possible through investigation of the factors involved in this process, so as to create and implement barriers and, through this, reduce the risk to the patients' health<sup>(1,2)</sup>.

A 'medication error' is understood as any event which could be prevented, which can culminate in the inappropriate use of medications; these errors are related to different factors<sup>(3)</sup>. Among these factors, the literature in particular emphasizes<sup>(4-7)</sup>: omission, errors in dosage and time, errors in administration technique and giving the medication by the wrong route. What is most relevant is the outcome of this type of error, which can result in an increase in the length of hospitalization, a worsening in the health situation, and causing disabilities or the deaths of patients<sup>(1,2)</sup>.

The process of medication follows along path until it is actually administered to the patient. It begins in its production, continues with its prescribing and dispensing, and culminates in its administration. This last covers the entire process of checking, diluting, preparing and administering the medication to the patient. Nursing is the health profession responsible for the final part of this process, the administration of medications, and its work is therefore crucial for avoiding errors of this nature.

Based in this complex system of medication, this review aims to identify in the current literature the relationship between medication errors and the nursing team.

## ● METHODOLOGY

A documentary study undertaken by two independent collaborators, in the period from 1<sup>st</sup> to the 5<sup>th</sup> of July 2015, using the premises of the integrative literature review<sup>(8,9)</sup>, guided by the following question: what scientific production is being constructed regarding medication errors related to the nursing team? For this, an integrative review protocol was elaborated, as required by studies of this nature<sup>(8,9)</sup>.

The study was undertaken in the following databases: the Thesis Database of the Coordination for the Improvement of Higher Education Personnel (CAPES); the Virtual Health Library (*Biblioteca Virtual em Saúde*) (BVS); the Scientific Electronic Library Online – SciELO; and in PubMed (US National Library of Medicine National Institutes of Health) of the National Center for Biotechnology Information (NCBI). The key with the descriptors used was: Nursing OR Nursing team AND Medication errors.

The studies included were made up of scientific articles, theses and dissertations, which contained the descriptors in the abstract and/or in the title, which were published in English or Portuguese, in the period 2011 – 2015, in full, and which it was possible to access without payment through the Federal University of Santa Catarina (UFSC). The following were excluded: letters, reviews, systematized reviews, books, chapters of books, governmental documents, newsletters and duplicated studies (which appeared in more than one database) (Figure 1).

After the meticulous selection, the studies were organized using software for analysis of qualitative data, Atlas.ti. 7.0, and were analyzed using the precepts of Bardin's thematic content analysis<sup>(10)</sup>, following the steps of pre-analysis, exploration of the material and treatment and interpretation of the results. Based on the exhaustive reading of each article, the information was codified so as to obtain the nucleus of meaning, and hence to highlight the record units (quotations, in the language of software), attributing identifying codes to these units. Finally, the categories (families) were organized in accordance with this study's objective, in two categories, these being: characteristics of the studies found, and nursing's relationship with medication errors. This study's final sample was made up of 32 studies.

As this is an integrative literature review, prior evaluation by a Committee for Ethics in Research with Human Beings was dispensed with.

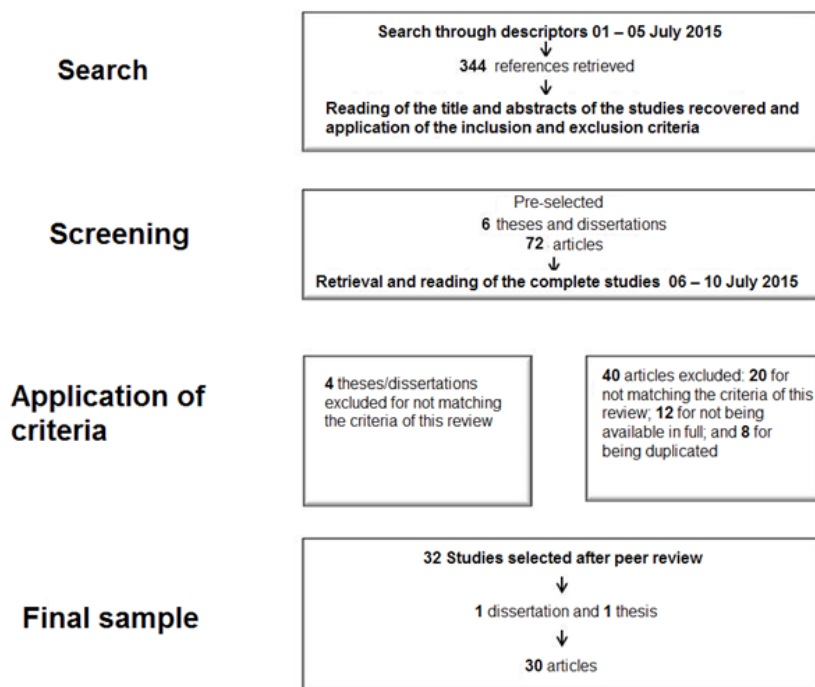


Figure 1 – Selection of the sample. Florianópolis, State of Santa Catarina, Brazil, 2015

## ● RESULTS

### Characteristics of the studies found

The studies selected for this review are presented in Table 1. The findings in relation to the articles' authors and titles are listed below.

Table 1 - Publications regarding medication errors which involve the nursing team. Florianópolis, SC, Brazil, 2015

Authors	Title
TEIXEIRA <sup>(11)</sup>	<i>Análise de causa raiz de incidentes relacionados à segurança do paciente na assistência de enfermagem em unidades de internação, de um hospital privado, no interior do Estado de São Paulo</i> (Analysis of the root cause of incidents related to patient safety in nursing care in inpatient units, in a private hospital, in the interior of the State of São Paulo)
DALMOLIN <sup>(12)</sup>	<i>Erros de medicação no ambiente hospitalar: uma abordagem através da bioética complexa</i> (Medication errors in the hospital environment: an approach through complex bioethics)
FONTANA, et al <sup>(13)</sup>	<i>Análise documental da mídia escrita sobre eventos adversos ocorridos na prática da enfermagem</i> (Documentary analysis of the written media regarding adverse events which took place in the nursing practice)
LOPES, et al <sup>(14)</sup>	<i>Análise da rotulagem de medicamentos semelhantes: potenciais erros de medicação</i> (Analysis of the labeling of similar medications: potential medication errors)
ROQUE; MELO <sup>(15)</sup>	<i>Avaliação dos eventos adversos a medicamentos no contexto hospitalar</i> (Evaluation of adverse events with medications in the hospital context)
BOHOMOL <sup>(16)</sup>	<i>Erros de medicação: estudo descritivo das classes dos medicamentos e medicamentos de alta vigilância</i> (Medication errors: a descriptive study of the classes of the medications and high alert medications)
BELELA; PEDREIRA; PETERLINI <sup>(17)</sup>	<i>Erros de medicação em pediatria</i> (Medication errors in pediatrics)
CORBELLINI, et al <sup>(18)</sup>	<i>Eventos adversos relacionados a medicamentos: percepção de técnicos e auxiliares de enfermagem</i> (Adverse events related to medications: the perception of nursing technicians and auxiliary nurses)

VELOSO; TELLES FILHO; DURÃO <sup>(19)</sup>	<i>Identificação e análise de erros no preparo de medicamentos em uma unidade pediátrica hospitalar</i> (Identification and analysis of errors in the preparation of medications in a hospital pediatric unit)
YAMAMOTO; PETERLINI; BOHOMOL <sup>(20)</sup>	<i>Notificação espontânea de erros de medicação em hospital universitário pediátrico</i> (Spontaneous notification of medication errors in a pediatric teaching hospital)
PICHLER, et al <sup>(21)</sup>	<i>Erros de medicação: análise ergonômica de utensílios da sala de medicação em ambiente hospitalar</i> (Medication errors: ergonomic analysis of the utensils of the medication room in the hospital environment)
PARANAGUÁ, et al <sup>(22)</sup>	<i>Prevalência e fatores associados aos incidentes relacionados à medicação em pacientes cirúrgicos</i> (Prevalence and factors associated with incidents related to medication in surgical patients)
CAMERINI; SILVA <sup>(23)</sup>	<i>Segurança do paciente: análise do preparo de medicação intravenosa em hospital da rede sentinela</i> (Patient safety: analysis of the preparation of intravenous medication in a hospital of the 'sentry network')
LORENZINI; SANTI; BÃO <sup>(24)</sup>	<i>Segurança do paciente: análise dos incidentes notificados em um hospital do sul do Brasil</i> (Patient safety: analysis of the incidents notified in a hospital in the South of Brazil)
HARADA, et al <sup>(25)</sup>	<i>Segurança na administração de medicamentos em pediatria</i> (Safety in the administration of medications in pediatrics)
SILVA; CAMERINI <sup>(26)</sup>	<i>Análise da administração de medicamentos intravenosos em hospital da rede sentinela</i> (Analysis of the administration of intravenous medications in a hospital of the 'sentry network' <sup>(11)</sup> )
TEIXEIRA; CASSIANI <sup>(27)</sup>	<i>Análise de causa raiz de acidentes por quedas e erros de medicação em hospital</i> (Analysis of the root cause of accidents from falls and medication errors in hospital)
ROZENFEL; GIORDANI; COELHO <sup>(28)</sup>	<i>Eventos adversos a medicamentos em hospital terciário: estudo piloto com rastreadores</i> (Adverse events with medications in a tertiary hospital: a pilot study with tracking)
SILVA; CASSIANI <sup>(29)</sup>	<i>Análise prospectiva de risco do processo de administração de medicamentos anti-infecciosos</i> (Prospective analysis of risk in the process of administering anti-infective medications)
LOPES, et al <sup>(30)</sup>	<i>Erros de medicação realizados pelo técnico de enfermagem na UTI: contextualização da problemática</i> (Medication errors made by the nursing technician in ICU: contextualization of the issue)
SILVA, et al <sup>(31)</sup>	<i>Eventos adversos a medicamentos em um hospital sentinela do Estado de Goiás, Brasil</i> (Adverse events involving medications in a sentinel hospital in the State of Goiás, Brazil)
LE MOS; SILVA; MARTINE <sup>(32)</sup>	<i>Fatores que predisõem à distração da equipe de enfermagem durante o preparo e a administração de medicamentos</i> (Factors which predispose to distracting the nursing team during the preparation and administration of medications)
PRAXEDES; TELLES FILHO <sup>(33)</sup>	<i>Erros e ações praticadas pela instituição hospitalar no preparo e administração de medicamentos</i> (Errors and actions practiced by the hospital institution in preparing and administering medications)
FERREIRA, et al <sup>(34)</sup>	<i>Evento adverso versus erro de medicação: percepções da equipe de enfermagem atuante em terapia intensiva</i> (Adverse event versus medication error: perceptions of the nursing team working in intensive care)
SHAHROKHI; EBRAHIMPOUR; GHODOUS <sup>(35)</sup>	Factors effective on medication errors: a nursing view
LAWTON, et al <sup>(36)</sup>	Identifying the latent failures underpinning medication administration errors: an exploratory study
MARQUET, et al <sup>(37)</sup>	One fourth of unplanned transfers to a higher level of care are associated with a highly preventable adverse event: a patient record review in six Belgian hospitals
VALENTIN, et al <sup>(38)</sup>	Safety climate reduces medication and dislodgement errors in routine intensive care practice
CHANG; MARK <sup>(39)</sup>	Moderating effects of learning climate on the impact of RN staffing on medication errors
PAQUET, et al <sup>(40)</sup>	Psychosocial work environment and prediction of quality of care indicators in one Canadian health center

WEST; PATRICIAN; LOAN <sup>(41)</sup>	Staffing matters - every shift
MATTOX <sup>(42)</sup>	Strategies for improving patient safety: linking task type to error type

<sup>(1)</sup>The Brazilian National Health Surveillance Agency (ANVISA) set up a network of health centers to assist in the collecting of data on health products. This network is called the 'sentry network' (rede sentinela). Translator's note.

Regarding language, Portuguese predominated with 24 studies (72%) with eight publications in English (28%). Regarding country of publication, emphasis was on Brazil with 22 studies, the United States of America with nine, and New Zealand with one study. There was a predominance of studies with a quantitative nature – 21 (66%), followed by qualitative studies of which there were seven (22%), while academic essays were responsible for 12% of the findings, with four studies.

For data collection, documentary research predominated in 12 publications (37%), with the following used as sources: patients' medical records, notifications of adverse events and news circulated in the Press; interviews and questionnaires appear in 10 (32%); nonparticipant observation was used in eight (28%); while two studies made use of photographic analysis, and one made use of a case study.

### Nursing's relationship with medication errors

The relationship of the nursing team with the errors practiced with medication was divided in two subcategories: the direct relationship – referent to the causes of the errors directly related to the nursing team; and the indirect relationship – relating to the causes associated with other members of the health team or with some other point in the process of the administration of medications.

#### Direct relationship

The causes related directly to the nursing staff are shown in Figure 2.

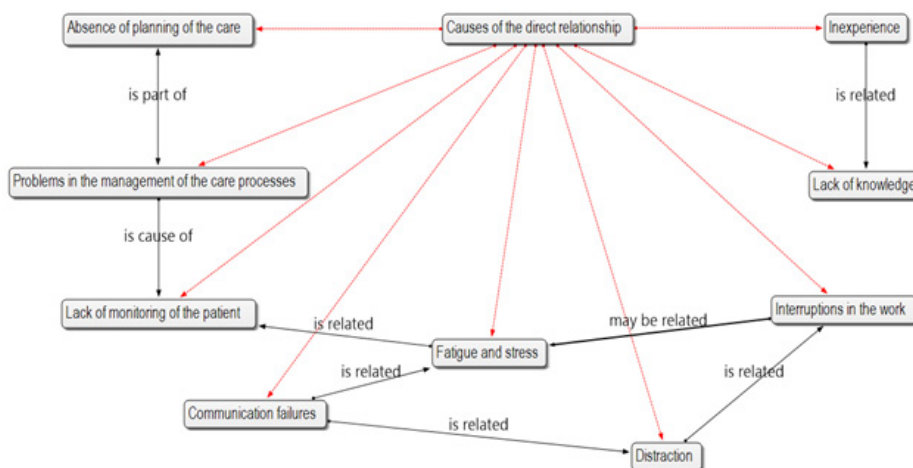


Figure 2 – Causes of the direct relationship. Florianópolis, SC, Brazil, 2015

The causes which may be attributed directly to the nursing team appear clearly in the studies found. The large majority of them refer to errors in preparing and administering medications (21 studies).

Important emphasis is placed on the issue of fatigue and stress, which is closely related to the process of nursing work which is configured in a stressing way in the majority of health institutions.

#### Indirect relationship

The indirect relationship which the nursing team has with medication errors arises from six factors, which differ but are highly interrelated, as shown in Figure 3.



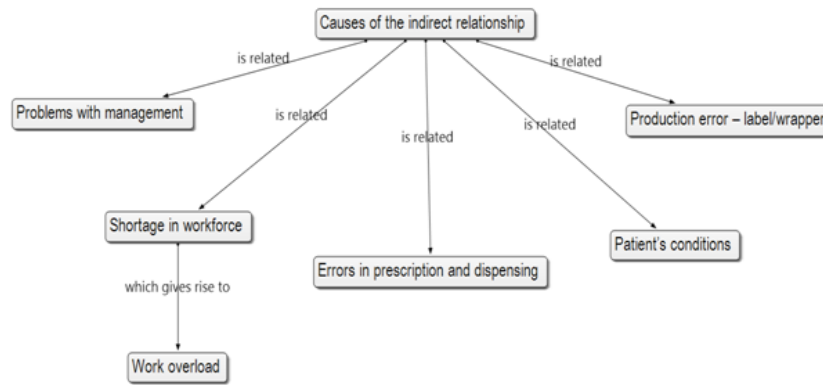


Figure 3 – Causes of the indirect relationship. Florianópolis, SC, Brazil, 2015

The indirect causes of the medication errors are associated with the institutions' management problems, relating to the working conditions, problems arising from the action of other professionals – physicians and pharmacists, problems with the production of medications and problems with the conditions of the patient herself.

## ● DISCUSSION

The errors highlighted most in the literature are related directly to the nursing team, as they originate precisely in the end of the process of the administration of medications; these being wrong time medication administration errors and wrong infusion rate errors<sup>(11,12,18,20,23,26,29-32,38)</sup>. Besides the fact that they are emphasized in the studies, these errors call attention due to the outcome which begins in the failure of the therapy and leads to the patient's death.

The direct relationship is influenced by the fatigue and stress generated in the work. Stress and tiredness are considered to be frequent causes of medication errors, such as errors in dosage, in time, in technique and in the infusion rate<sup>(43)</sup>. Stress negatively influences the relationships between the professionals and makes the care become mechanized, which intensifies the conditions likely to cause the error to occur<sup>(44)</sup>.

The lack of planning and also the lack of experience and of knowledge of the nursing team are directly linked to the production of the error. Knowledge and experience deficits were identified in situations in which student nurses of technical and undergraduate level were working without supervision (11 studies). Inadequate knowledge of the medication, regarding the drugs' therapeutic mechanisms, alternative forms of the drugs, and incorrect dosage calculations are responsible for many of the episodes involving medication<sup>(45,46)</sup>.

The communication failures and the distractions appear as factors which predispose to error, it being the case that efficient communication strongly minimizes errors, even to the point of stopping them from occurring<sup>(4,47)</sup>. Distraction arises from innumerable factors present in the professionals' routine, such as cell phones, television, and conversations between the team and other professionals, among others.

Regarding the indirect relationship, it is necessary to emphasize the patient's conditions at the time of the care. This review observed that the highest frequency of errors occurs in the Inpatient Units (nine studies), in the Intensive Care Units (ICU) (five studies) and in Pediatrics (four studies), which may be explained by the characteristics of the service users in these units – these are usually patients who are more physically vulnerable, with a large quantity of medications and procedures – and by the high work demands required of the nursing team. Consequently, this patient-related factor influences fatigue and stress. The more seriously ill the patient, the more care is necessary, and the health institutions do not always have enough nursing professionals, which contributes to the work overload and to the workers' physical and mental stress.

The errors which occur in prescribing and dispensing appear in six studies and emphasize that these errors constitute failures in the barriers which precede the administration of medications by the

nursing staff. In one study undertaken in countries of the Middle East, the error rates in dispensing and prescribing varied from 7.1% to 90.5%, the most common errors being incorrect dose and frequency<sup>(48)</sup>.

In analyzing the influence of the wording of the medical prescription in the errors regarding the route of administration, in one study undertaken<sup>(46)</sup>, the authors observed that 91.3% of the prescriptions contained initials/abbreviations, 22.8% did not contain the patient's data and 4.3% lacked data and contained crossings-out. These errors are common and can trigger a series of problems in the process of administering medications. The authors also assert that other factors also contribute to prescribing errors, such as lack of knowledge, the name of the medication, calculation of dosages and inappropriate formulations<sup>(46)</sup>.

Evidence indicates that the health professionals undertake work in which medication errors can occur; however, the working conditions offered by the health institutions have a strong influence in the generation of the error<sup>(4)</sup>. The shortage in the workforce, which generates a work overload, has a significant link with medication errors, this being an issue which needs to be considered by the managers of the health service and by those who formulate policies<sup>(4,49,50)</sup>. Due to this, considering patient safety necessarily requires one to rethink nurses' working conditions.

The issue of medication errors extends outside the walls of the health institutions, due to errors in the production of the medications. The results of the study which considered the labeling of medications are concerning, as 43% of the medications were possibly similar and 44% had the same color label or packaging, configuring a strong potential for errors in dispensing, storage and administration of medications<sup>(14)</sup>.

The errors associated with the labeling of medications occur frequently in the various forms of presentation. In order to change this context, it is essential to approach it in different ways, with different focuses: technology, education and a culture of safety are examples of strategies for potentially reducing medication errors<sup>(51)</sup>.

## ● FINAL CONSIDERATIONS

In this review, it was evidenced that nursing has a strong link with medication errors. This link is made clear, particularly, through two types of relationship: the direct and indirect. The direct relationship has the most implications for the nurses' work process, as it reproduces the adversities faced by the profession itself, such as inadequate training and knowledge, the stress experienced daily through double or triple work shifts, the communication failures between the components of the team, and distraction.

The indirect relationship can be explained by the fact that nursing, although not primarily responsible for the error in the medication process, is considered to be the last barrier for stopping the error from arriving at the patient. In this context, all the errors which precede the administration of medications can be avoided or minimized through the nurses' actions.

It is concluded, therefore, that the mechanisms for preventing errors have to involve all the professionals involved in the medication system, such that all may be equally responsible for the outcome. Most healthcare is collective work in which the responsibilities must also be shared. This study has limitations, which may have reduced the sample size, referent to the choice of the descriptors and of the languages, and to the absence of the complete text of some studies, bearing in mind that they were accessed free-of-charge via the Federal University of Santa Catarina.

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