Strategies for the prevention of errors in medication administration: a contribution to nursing practice

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INTEGRATIVE REVIEW OF THE LITERATURE

Strategies for the prevention of errors in medication administration: a contribution to nursing practice

Estratégias para a prevenção de erros na administração de medicamentos: contribuição para a prática da enfermagem

Estrategias para la prevención de errores en la administración de fármacos: un aporte a la práctica de enfermería

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ABSTRACT

Obejctive: Identify the factors related to the professional practice of nursing what lead to errors in medication administration and analyze the strategies pointed to prevent and/or minimize these errors. **Method**: This is an integrative literature review. To the selection the analyzed material were used the databases SciELO (Scientific Electronic Library Online), LILACS (Latin-American and Caribbean Literature in Science of Health) and BIREME (Virtual Health Library), in the period to april to june of 2013. **Results**: The strategies suggested for the prevention of errors, was the continuing education of professionals and the proper dimensioning. **Conclusion**: Educational measures and changes in nursing practices collaborate to prevent errors and promote holistic care with minimal risk and maximum quality. **Descriptors**: Medication Errors, Nursing Team, Nursing.

RESUMO

Objetivo: identificar os fatores relacionados à pratica profissional da enfermagem que levam a erros na administração de medicação e analisar as estratégias apontadas para prevenir e/ou minimizar estes erros. **Método**: Trata-se de uma revisão integrativa da literatura. Para a seleção do material analisado foram utilizadas as bases de dados SciELO (Scientific Electronic Library Online), LILACS (Literatura Latino-Americana e do Caribe em Ciências da Saúde) e BIREME (Biblioteca Virtual em Saúde), no período de abril a junho de 2013. **Resultados**: Os fatores que propiciam os erros de medicação vão desde problemas de formação a problemas de organização e estrutura dos serviços de saúde. As estratégias apontadas para a prevenção dos erros, foi a educação continuada e o dimensionamento adequado de profissionais. **Conclusão**: Medidas educativas e mudanças nas práticas de enfermagem colaboram para a prevenção dos erros e promovem um cuidado integral com o mínimo de risco e máximo de qualidade. **Descritores**: Erros de medicação, Equipe de enfermagem, Enfermagem.

RESUMEN

Objetivo: Identificar los factores relacionados con la práctica profesional de la enfermería que conducen a errores en la administración de medicamentos y analizar las estrategias destinadas a minimizar estos errores. **Método:** Se trata de una revisión integradora de la literatura. Para la selección del material analizado hemos utilizado las bases de datos SciELO, LILACS y BIREME, en el período de abril/junio 2013. **Resultados:** Los factores que promueven los errores de medicación que van desde problemas de formación a los problemas de organización y estructura de los servicios de salud. Las estrategias sugeridas para la prevención de errores, fue la formación continuada de los profesionales. **Conclusão:** Las medidas educativas y los cambios en las prácticas de enfermería colaboran para evitar errores y promover la atención integral con el mínimo riesgo y máxima calidad. **Descriptores:** Errores de medicación, Grupo de Enfermería, Enfermería.

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INTRODUCTION

The medication preparation and administration are common practices performed by the nursing staff in their daily work, which are known as major responsible for the care, especially to remain long time in the health service, providing direct care to patients. Due to this fact is attributed most of the errors for the nursing staff. The National Coordinating Council for Medication Error Reporting and Prevention[1] defines a medication error as any preventable event that may cause or lead to patient harm while the medication use is inappropriate, no matter if the product is under the responsibility of the health professional, patient or consumer.

Medication errors can still be attributed to the nursing staff for several causes, among them by acting in the last stage of drug therapy, this is, administration of the drug, by being involved in a poor system of communication and by factors such as high work overload. This way, it is important that these professionals are tasked to seek more knowledge and disseminate findings that can minimize such errors, ensuring a assistance with maximum quality and minimum aggravation.[2]

Data show that 30% of the damage related to the hospital environment are related to medication errors and that any slip in some of the stages of this process, this is, the prescription, dispersion, preparation and administration of medication, is quite undesirable for achieving quality of health services, detrimental to the patient, multidisciplinary team and hospital.[3]

The various steps of the medication system depend on all health professionals and they go from the prescription, which is established by institutional protocols, but most often it is the responsibility of the doctor distribution and dispersion of the drug that is under the responsibility of the pharmacist and just as important is the last step, the preparation and administration of medication, including this, since the technique of administration action to observation of the effects of medication, being the entire responsibility of the nursing staff.[4]

Although everyone has their role in the medication process, is not constant in the hospital system a multidisciplinary work, which included for all skills, monitoring, visualization and reporting of any reactions that arise in client, before, during and after medication administration. This perspective is necessary that the multi-professional team is qualified, trained and educated to provide comprehensive care, which continuously observe the patient during medication system, particularly the nursing staff, which is reciprocally connected to the subject since his admission to his hospital discharge which is reciprocally connected to the subject since his admission to hospital discharge in order, to avoid that the maximum error related to medicines.[5]

Correlative to this, currently circulating in the collective scenario discussions about patient safety and facts that demonstrate “unprepared” these professionals in this process, leading to dissemination of many errors, which has caused serious consequences to the client, aggravating your general health and, consequently, causing a disruption in the hospital. View of these facts, this study aims to identify the factors related to professional nursing practice that lead to errors in medication administration and analyzes the strategies aimed to prevent and / or minimize such errors.

METHODOLOGY

This is a integrative literature review, realized according with the six operational steps: problem identification, elaboration of the guiding question; establishment of criteria for inclusion

and exclusion, data collection on a scientific basis; selection of articles, analysis and interpretation of results.[6]

The question that guided this study was: Which factors related to professional nursing practice that lead to error in the administration of medication and what strategies identified for nursing prevent and / or minimize these errors?

As for literature selection, the following databases were used: SciELO (Scientific Electronic Library Online), LILACS (Latin American and Caribbean Literature on Health Sciences) and BIREME (Virtual Health Library). To survey studies and the expansion of the following search terms were used controlled: Nursing and medication errors.

The selection of the sample according to the following inclusion criteria: full papers available electronically; focusing the research theme in individuals above 18 years, studies published in the temporal cut from 2002 to 2012. Exclusion criteria established are: studies of revisions; research in pediatric services; studies in editorials, case studies, epidemiological studies, dissertations, theses and reviews formats. Figure 1 shows the strategy used for the identification and selection of articles included in the study sample.

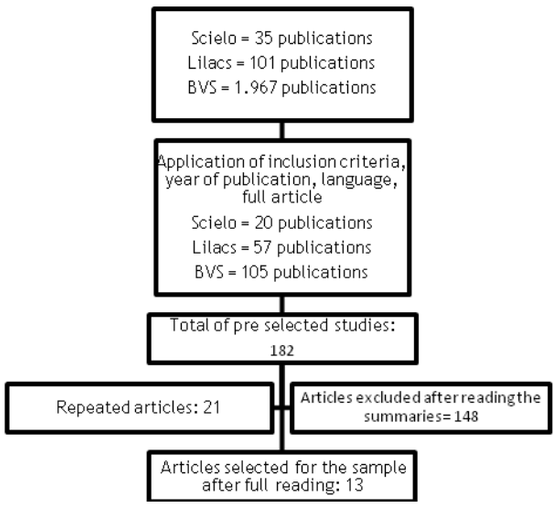

Figure 1: Flowchart of sample selection. Source: Direct Search. Teresina, PI, Brazil, 2013.

Before applying the inclusion criteria were identified 35 articles on the basis SCIELO, 101 in LILACS, and 1,967 in BVS, was however identical items in the three databases. This way, following the criteria employed and reading the abstracts were selected for this study sample 04 articles on the basis SCIELO, 04 in LILACS and 05 in BVS, resulting in a sample of 13 studies.

To help the analysis of the data was elaborated a summary table containing the following items: item identification, purpose, study design, sample size and type of each article, the main causes of errors and strategies identified as prevention.

RESULTS AND DISCUSSION

Through electronic search 2,103 studies were located. Of this total, 1,921 studies were excluded for not meeting the inclusion criteria and 21 excluded by repetition, being pre-selected 148 articles. After full reading the total study sample was configured of 13 articles. The selected studies were identified in chronological order as E1 to E13.

When analyzing the studies found, it was found that most were published in the years 2010 (E9, E10, E11 and E12), followed by the year 2002 (E1 and E2) 2005 (E4 and E5), and 2007 (E7 and E8), years of smaller publications was 2004 (E3), 2006 (E6) and 2011 (E13). The years 2003, 2008, 2009 and 2012 there was no publication of the theme in the sample used for analysis. Table 1 summarizes the contents of such publications as the title, authors, year of publication.

Frame 1- Distribution of selected articles: title, authors, year of publication. Teresina, PI, Brazil, 2013.

Study	Title	Authors	Year
S1	Medication errors and consequences for nurses and clients: an exploratory study.	Viviane Tosta de Carvalho; Silvia Helena de Bortoli Cassiani	2002
S2	Analysis of the behaviors of nursing professionals against errors in medication administration	Viviane Tosta de Carvalho; Silvia Helena de Bortoli Cassiani	2002
S3	Analysis of the administration of vancomycin in surgical hospitalization units of a university hospital	Heloisa Helena Karnas Hoefel; Lucy Zini;Terezinha Lunardi; Joseane Brandão dos Santos;Simone Mahmud; Ana Maria Magalhães	2004
S4	Events adverse with medication in Emergency Services: Professional conduct and feelings experienced by nurses	Audry Elizabeth dos Santos; Kátia Grillo Padilha	2005
S5	Strategies to prevent medication errors in the emergency department	Regina Célia de Oliveira; Ana Elisa Bauer de Camargo; Silvia Helena de Bortoli Cassiani	2005
S6	Consequences of medication in intensive care units and semi-intensive	Maria Cecília Toffoletto; Kátia Grillo Padilha	2006
S7	Feelings of nurses after the occurrence of medication errors	Jânia Oliveira Santos; Ana Elisa Bauer de Camargo Silva; Denize Bouttelet Munari; Adriana Inocenti Miasso	2007
S8	Medication errors: the importance of reporting on management of patient safety	Elena Bohomol; Laís Helena Ramos	2007
S9	Investigation of the technique of administration of medication by enteral tubes in general hospital	Rogério Dias Renovato; Priscilla Daiane de Carvalho; Ruth dos Santos Araújo Rocha	2010
S10	Approaches adopted by nursing staff following the occurrence of medication errors	Jânia Oliveira Santos; Ana Elisa Bauer de Camargo Silva; Denize Bouttelet Munari; Adriana Inocenti Miasso	2010
S11	Conduct of future nurses through medication error	Cristiane Morais Borges Pereira; Orcidney Borges Pereira; Rosadélia Malheiros Carboni	2010
S12	Perception of nursing staff about causal factors of errors in medication administration	Juliana Nogueira Franco; Gabriele Ribeiro; Maria D'Innocenzo; Bricia Pompeo Amaral Barros	2010
S13	Medication errors: analysis of knowledge of the nursing staff of a hospital institution	Paulo Celso Prado Telles Filho; Marcus Fernando da Silva Praxedes; Marcos Luciano Pimenta Pinheiro	2011

Source: Direct Search. Teresina, PI, Brazil, 2013. Legend: S-Study

Concerning the results of the studies, we found errors that occurred with the administration of medications and the consequences of these errors for patients and nurses.

Table 1 shows the distribution of studies according to the main findings.

Table 1- Distribution of selected articles according to primary results. Teresina, PI, Brazil, 2013.

Study	Main Results
S1	Negative consequences both for patients and for professionals and may arise in the first 24 hours or later for both. Harm to patients was characterized by physiological changes in hematological, cutaneous, metabolic, respiratory, cardiovascular and renal systems increased their stay in hospital. For professional consequences was characterized by wasting time (used to reverse the error) culminating in increasing the workload also has repercussions on both warnings and notifications made by nurses as by the board of nursing, resulting in dismissal as punitive method used.
S2	Behaviors related to administration: most common errors was submitted to the administration of the drug on the wrong patient, followed by the wrong route. Behaviors related to perception: communication error cited by the professional himself that triggered the error, followed by the denunciation of another professional who realized the error.
S3	At least one error occurred in 40 (85%) of all infusions. The errors were primarily related to increased concentration and time incorrect infusion in 34 (72%) occasions, and residual dose in equipment in 27 (54%) administrations among other. We did not identify a significant association between training and different errors (p> 0.01).13 of 47 observations (28%) were in central catheters and 34 (72%) were peripheral catheters administrations. Of these 34, 14 (41%) catheters were anticoagulant. No administered saline or distilled water to avoid drug interactions before administering the antibiotic.
S4	The conducts in order of priority were: communicate to physicians (69.8%), increase patient care (55.1%) and record in medical record (28.0%). Concern was the predominant affective expressions (79.3%), followed by impotence and anger (22.4%, each) and insecurity (24.4%).In relation to feelings, no statistically significant differences neither in the time of graduation, nor in time of experience in the emergency area were found. It was observed that the statistically significant difference between the feelings with age and previous experience with medication errors.
S5	There was prescriptions rate that was no explicit presentation of the drug and the dose of drug above 80%. 34.2% of prescription drugs there was no record of medication administration on time. 51.5% of the drugs were not administered. The prescriptions were illegible, and the records were, mostly, not filled out correctly.
S6	Approximately 96% of patients were victims of medication errors. As the dose omission and erroneous administration of drugs characterized as the most common failures respectively.
S7	The most common feelings related to the error are: The most common feelings are related to the error: panic, despair, worry, guilt, shame, fear and insecurity. Upon error primordial feelings is despair and panic, then when it becomes aware of the error appears to guilt, worry, insecurity and fear of harm or death to the patient.
S8	Lack of uniformity in understanding what is a medication error and when it should be notified to the doctor or completed the incident report. The study points to the need to develop educational programs, that clarify what are medication errors discussing scenarios to understand the causes of the problem with proposals for improvement.
S9	78.26% of the drugs were administered by nasogastric tube and 97% of the drugs were in solid dosage forms. During the preparation phase of the 23 situations observed not was employed the correct hand hygiene technique. Among the interviewed employees, 86.96% did not perform any update course, related to pharmacology and medicine administration.
S10	The conduct adopted are summarized in communicating the error to the doctor, nurse or supervisor and then direct measures focused to the patient in order to prevent or reverse possible consequences of the error. Procedures such as: administration of antagonist drugs or those who should have been administered exams and resuscitation (if applicable) are the main conduits led to the patient.
S11	68% of students researched believe it is necessary to enhance their knowledge about the calculations with percentages involving medications. In reference to the knowledge of the rule of three, 47% report having little doubt, 45% and 8% no doubt many questions. Regarding knowledge of the meaning of "medication error", 65% said they would know to identify a medication error and 35% answered no. About half of the participants, 51% believe that the nursing assistants and medical prescriptions are responsible for medication error.
S12	Most failures were pointed exchanges of patients at the time of administering the medication. 13% of the subjects responded that the routine preparation induced the error. 12% reported verbal prescriptions along with miscalculations medication. Similar names, grouped with short distraction was cited by 11% and 10% of participants, respectively. Continuing education, updates, improvements and recycling to increase the knowledge acquired in basic training curriculum, assist in reducing flaws. And 68% of the errors were detected in the study by the onference of the prescriptions.
S13	The results of the study classified as identical, similar or discordant with the definition of what is a medication error according to the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP). 68% possessed a similar definition to the concept, but 32% disagreed. No professional has shown that the exact definition NCCMERP considered, but the ideas are the most logical, showing possibilities of change to minimize the errors.

Source: Direct Search. Teresina, PI, Brazil, 2013. Legend: S-Study

It is noticed that several factors guide the most common for the occurrence of errors in the administration of medications causes. Among them, we highlight the little investment institutions for capacity building of professionals, illegible handwriting of the doctor, the lack of knowledge by some professional or little interest in continuing and higher education workday, giving health professionals physiological wear.

Several studies point to illegible handwriting of the doctor as one of the most common causes of medication errors, then the overload of work of nursing staff and the lack of communication, leading them to believe that through coordinated and structured communication of the multidisciplinary team can -promoting conditions that prevent many errors.[7,8]

The error occurring during any stage of the medication administration process can have many consequences, which can be rapid or late, directed both to the patients and for the professionals involved. In patients it may interfere directly in health, increasing problems such as increased pain or causing changes in their systems as renal, cardiovascular and circulatory. For nursing professionals, there are many consequences that can result in extra procedures, notification by the nurse, written warning or even dismissal of the professional involved in the error.[9, 10]

In this context, it is important to emphasize that the measures adopted to professionals involved in the error are very poor, showing unpreparedness of the Health System in relating the occurrence of the error as a form of learning for professionals. Most health professionals recognize the need of notification of the error. However, there are still many professionals opposed the notification, for fear that warnings can result in dismission.[11]

In this perspective, studies show that the notification system does not result in an apprenticeship. The development of the error is related to a number of penalties in which professionals are exposed.[12,13]

In process of nursing work in the hospitals, errors with medication administration must work as a promotion of service quality.Nurses should understand that medicine is a tool and should be responsible for the results of your use, such as their management practices should ensure safety in handling those medications. [14,15]

Factors related to nursing practice that lead to errors in medication administration have been described in all studies analyzed, highlighting the lack of continuing education and problems with medical prescriptions (Table 2).

Table 2- Factors related to the professional practice of nursing that lead to errors in medication administration, 2002-2012. Teresina, PI, Brazil, 2013.

Studies	Factors related to the professional practice of nursing that leads to errors in medication administration.
S1	Underreporting of medication errors; penalty to which professionals are exposed for having committed the error
S2	Large workload professional and overwork
S3	Lack of awareness of the adverse events that may be caused by management errors
S4	Illegible prescriptions, lack of relevant data and information in the pages of prescription medications, polypharmacy, drug interactions and drugs not administered
S5	Not cited factors related to errors
S6	Excess team activities; accumulation of activities resulting in fatigue and inattention; underreporting resulting from the culture of punishment and ethical-legal sanctions
S7	High workload and low pay; various employment ties
S8	Illegible prescriptions, lack of data and information in the pages of prescription medications, lack of uniformity of conduct and understandings, knowledge deficiency, little work experience
S9	Incorrect technique for hand hygiene, inadequate notes regarding patient identification; joint administration of drugs; dragees crushed controlled release; incomplete information about the medication and the patient and no standardization of techniques
S10	Lack of qualification and continuing education
S11	Lack of attention; overwork; knowledge deficiency; illegible handwriting on the prescription and inadequate team orientation from the Nursing professionals
S12	The routine preparation, verbal prescriptions along with miscalculations medication. Similar names, grouped with distraction abbreviation. The rush to serve patients, lack of knowledge about prescription medication and unreadable
S13	High workload, lack of attention, fatigue,rush, stress and overload of work, working conditions faced by nursing staff, lack of knowledge

Source: Direct Search. Teresina, PI, Brazil, 2013. Legend: S-Study

Table 3 presents the strategies identified by the studies analyzed to prevent and / or minimize errors arising from the administration of medication. Among the strategies noted, there is the continuing education and continuing review of procedures for the work of the nursing staff.

Table 3- Strategies aimed to prevent and / or minimize these errors, 2002-2012. Teresina, PI, Brazil, 2013.

Studies	Strategies aimed to prevent and / or minimize these errors.
S1	Actions of continuing education and administrative
S2	Review the work process; professional training; incorporation of technological resources, creation of protocols and use of barriers
S3	Implementation study areas for future research and research priorities. Continuing education for professionals in regard the administration and knowledge about drug interactions
S4	Periodic training on the stages of the medication system (prescribing, dispensing and administration) Creation of a multidisciplinary committee involved with aspects of patient safety; creating a manual that contains information, standardizing the way to prescribe medications; trained medical residents , by computerized prescribing system, deployment and use of unit dose bar code medication administration
S5	There should be multidisciplinary and systemic focus under which medication errors should be analyzed. Stimulate communication of the error as one of the main ways to access the actual causes of events and their possible prevention
S6	Continuing education for professionals involved in the prescribing, dispensing and administration process
S7	Transform past mistakes into prevention strategies, establish safety rules as: Conference of labels, doses, among others, adequate working environment; psychological support to professionals; investment in continuing education and advanced technologies to improve care; encourage practices of non-punishment
S8	Environmental safe as adequate lighting temperature control, no noise, and personal interruptions, updated knowledge and work experience, educational programs, which clarify that are medication errors; continuing education, recycling courses and periodic training
S9	Continuing education; partnerships between professionals emphasizing interdisciplinary work; standardized and documented techniques, not crunch the controlled-release tablets; administering a drug at a time
S10	Continuing education for nursing professionals, supervision of medication administration; take advantage of mistakes and turn them into learning for the system, creating policies that encourage reporting of errors by professionals, creation of protocols and forms for notification, reporting and monitoring of error
S11	Continuing education, training courses
S12	Always use the five rights. The nurse must constantly evaluate your team and raise difficulties during preparation of medications. Guidelines, training and a robust system of standards and procedures are much more effective. The scheduling should be done by the nurse, and the employee responsible for drug administration the patient should consult the scheduling during the workday
S13	Updating knowledge; improving education of the nursing staff; guidance and supervision of staff by nurses; constant updating of the nursing team

Source: Direct Search. Teresina, PI, Brazil, 2013. Legend: S-Study

In the context of the consequences caused for nursing professionals, you realize that there are still interference in the emotional state, causing great psychological discomfort, cease only after some conduct is taken. Feelings of guilt, worry, fear and insecurity initially arise after the error, impacting heavily on their intimate, especially the

perception of little or total lack of attention during the procedure and also the fear of what may result in the patient's health. Shame arises when the professional decides to tell what happened to patient and team work, as the tranquility and relief appear when it is found that there was no serious injury to the patient.[16,17]

It is important to emphasize that errors occurring in drug therapy were also cited as possible strengths in the analyzed studies. So there is an incorporation of a system of intrinsic learning, appointed as a measure of education that ensures greater attention at the time of drug administration, by relating the technique with a negative occurrence. Also instigated the professionals to seek new information and more knowledge, increasing the demand for continuing education with the aim of reducing the occurrence of errors.[11]

In reference to the role of the nurse in regarding drug therapy, it may be noted that their practice is not only ended to a mechanized technique, but beyond this concept. This strengthens your professional assistance when opening the hand of health education, preparing the patient for it to be continually knower of their drug therapy, resulting in the time of his hospital discharge the fewer questions about your therapy and therefore less errors in your domicile.

The assistance of the nursing staff is prevalent since the patient's admission to hospital and the correct administration of medicines at home is closely related to the work of nurses, since it is the competence of this person to educate the patient to the correct use of medication after discharge.

CONCLUSION

From the study it was realized that the factors related to professional practice that lead to error in the administration of medication have different causal reasons, not related only to the stage of preparation and administration of the drug. Therefore, the occurrence of medication errors permeates a range of factors, including: the high workload of the nursing staff, a failure in communication between the multidisciplinary team, the illegible handwriting of requirements, lack of knowledge and little interest in continuing education, lack of financial incentive for institutions of professional capacity building, the grueling and fickle hospital routine with unexpected situations and countless procedures, increasing physical and psychological strain of the multidisciplinary team, especially the nursing staff, leaving them vulnerable to occurrence of errors during drug therapy.

Furthermore, the study enabled us to verify that there are several measures that help prevent and minimize medication errors, which are intrinsically related to the interface between the hospital manager, by supporting continuing education subjects, the participation of nurses in the qualification of professionals and the provision of professional institution in cultivating this reality to improve education. This way is necessary to strengthen the measures identified as strategic for the prevention of medication errors in labor clinical practice.

The results supported this research attended faithfully to the purpose, since faithful analyzed studies on the topic, expanding the scientific knowledge of professionals. This way, we seek to strengthen educational measures in the hospital scenario as new practices that help in the

prevention of errors, promoting holistic care with minimal risk and maximum quality.

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