



Safety in medication administration in pediatrics

Segurança na administração de medicamentos em Pediatria

Seguridad en la administración de medicamentos en pediatría

Maria de Jesus Castro Sousa Harada¹, Daniella Cristina Chanes², Denise Miyuki Kusahara³, Mavilde da Luz Gonçalves Pedreira⁴

RESUMO

Erros ou falhas podem ocorrer em qualquer fase do sistema de medicação. Em crianças, fatores como idade, peso, estatura, condições clínicas, características do metabolismo e escassez de medicamentos direcionados para a população pediátrica contribuem para a ocorrência de erros de medicação. Este artigo teve como objetivos, apresentar aspectos relevantes do sistema de medicação e recomendações para a redução de erros de medicação em crianças, com fundamentação nos princípios da segurança do paciente em pediatria.

Descritores: Erros de medicação/prevenção & controle; Enfermagem pediátrica; Segurança; Sistemas de medicação

ABSTRACT

Errors or failures can occur at any phase of the medication administration system. In children, factors such as age, weight, height, medical conditions, metabolic characteristics and lack of targeted drugs for the pediatric population contribute to the occurrence of medication errors. This article presents relevant aspects of the medication system and recommendations for reducing medication errors in children, with a foundation in the principles of patient safety in pediatrics.

Keywords: Medication errors/prevention & control; Pediatric nursing; Safety; Medication systems

RESUMEN

Errores o fallas pueden suceder en cualquier fase del sistema de medicación. Tratándose de niños, factores como edad, peso, estatura, condiciones clínicas, características del metabolismo y escasez de medicamentos dirigidos a la población pediátrica contribuyen en la ocurrencia de errores de medicación. En este artículo se tuvo como objetivos, presentar aspectos relevantes del sistema de medicación y recomendaciones para la reducción de errores de medicación en niños, fundamentados en los principios de la seguridad del paciente en pediatría.

Descripciones: Errores de medicación/prevenición & control; Enfermería pediátrica; seguridad; Sistemas de medicación

¹ Retired Professor from Escola Paulista de Enfermagem – Universidade Federal de São Paulo – UNIFESP.

² RN, Specialist Nurse in Pediatric Oncology. Master in Science.

³ RN, Phd in Science. Nurse from Escola Paulista de Enfermagem – Universidade Federal de São Paulo – UNIFESP.

⁴ RN, Phd in Nursing. Associated professor from Escola Paulista de Enfermagem, Universidade Federal de São Paulo – UNIFESP – São Paulo (SP), Brazil.

INTRODUCTION

The Institute of Medicine points out that around 7,000 deaths per year occur in the United States of America, caused by medication errors.⁽¹⁾ Errors related to the use of medication may result in serious consequences for patients and their families, such as generating incapacity, prolonging time of hospitalization and recovery, expose patients to a larger number of procedures and therapeutic measures, delay or prevent them from reassuring their social functions, and even cause death.^(2,3)

In this regard, it is pointed out that newborn infants, children, adolescents and adults present different characteristics of drug absorption, distribution, metabolism and excretion. Nevertheless, around 80% of the medications sold are destined for adults, and many of these drugs are used in children, including newborn infants.⁽²⁾

Consequently, the need for the administration of very fractionated doses of medications is identified, which leads to a greater demand of nursing time and work, in addition to excessive manipulation of solutions, which may compromise the quality of the procedure from various aspects, such as stability and possibility of contamination. Apart from these difficulties, the possibility of intoxication of pediatric patients is emphasized, as a result of the use of medications sold in high concentrations.⁽²⁾

PATIENT SAFETY: SPECIFICITIES OF PEDIATRICS

Medication error is characterized as an avoidable event that has occurred at any stage of medication therapy, which may or may not cause damage to the patient. The presence of damage characterizes the adverse event, which is defined as harm suffered during health care, causing secondary diseases, or worsening of the patient's general condition.^(4,5)

The medication process consists of various processes, such as prescription, review and validation of the prescription, distribution or dispensation, preparation, administration and follow-up of the patient, to monitor the action of or reaction to the medication. Errors or failures may occur at any of these stages.⁽⁶⁾ A Systematic Review performed for the purpose of identifying studies conducted with regard to medication errors in children identified the occurrence of errors during some of the stages of the process of medicating children, with the most frequent being errors of prescription (3-37%), dispensation (5-58%), administration (72-75%) and documentation (17-21%).⁽⁷⁾

A study conducted in England between 2007 and 2008, with the aim of analyzing only incidents involv-

ing medication related in a notification system, found that the age group most affected was from zero to four years of age, and that errors of dose or concentration accounted for 23% of the events involving children and newborns. The second most reported type of error was that of omission, and the third, error in administration.⁽⁸⁾

Research conducted with the aim of studying adverse occurrences in nursing practice in children assisted in a Pediatric Intensive Care Unit (PICU), with a sample of 113 adverse occurrences in 38 children (mean of 2.9 adverse occurrences per child), demonstrated that those related to medication accounted for 32.7%.⁽⁹⁾

In Brazil also, a study conducted in a PICU providing care for oncology patients, recorded 71 notifications of 110 medication errors, representing the occurrence of 227 errors per 1000 patients-day. According to the reports, error of omission was the most frequent type (22.7%), followed by errors of administration (18.2%), prescription and dose, which occurred with the same frequency, each corresponding to 16.4% of the reports.⁽⁴⁾

One of the factors that contributed to the occurrence of medication errors in children, especially error of dose, arise from the complexity of calculations that have to be made considering the child's age, weight, stature and clinical conditions, since the characteristics of drug absorption, distribution, metabolism and excretion differ among newborns, adolescents and adults.⁽⁸⁾

The most complex characteristic in medication therapy in children does not result in different approaches by supervisory agencies that produce safer practices. With respect to nursing, although the law on exercising the profession recommends that more complex practices should be performed by nurses, in the day to day activities of care provided, one observes that in their assistance protocols, health institutions confer the same attributes on nurses, nursing technicians and assistants as regards medication therapy performed in children, without increasing the number of nursing staff members to perform medication therapy practices, which may be contributing to the occurrence of various medication errors affecting pediatric patients. Another question of a legal nature refers to the lack of measures making it mandatory to sell parenteral medications in pediatric presentation. In fact, various countries have legislation to control drugs that are widely used in children. A study conducted in four pediatric units in a university hospital identified the intravenous administration of 8245 doses of medications, of 41 different drugs, of which none were in the **pharmaceutical** presentation for pediatric use.⁽²⁾

Authors⁽⁷⁾ have suggested a systematic review of various strategies for the prevention of this type of error in children, which are described in Chart 1.

Chart 1. Recommendation for the reduction of medication errors in children

Recommendations
1. Implementation of electronic medical prescription with dose limits suitable for pediatrics.
2. Implementation of alarm systems for medication interaction according to the child's age group and type of care and medication therapy prescribed.
3. Implementation of automatic devices for the distribution of medications.
4. Implementation of pharmacy for the manipulation of medications in the form of tablets, capsules, dragees and pills in liquid solution for use in children.
5. Standardization and adequate storage of medications.
6. Training of health professionals with regard to the prescription, labeling, distribution, administration and monitoring of medications.
7. Pharmacy with physical environment and human resources specialized in the pediatric field.
8. Continuous 24 hour assistance available from the pharmacist, even at a distance.
9. Establishment of adequate policies for "verbal orders" and medications administered "by the mother" or another family member/companion in the help environment.
10. Clear and precise labeling of medications, considering standardized use of decimals,
11. Implementation of measures for evaluating the use of drugs, notification and review of medication errors.
12. Promotion of access to relevant information about medications.
13. Making available a team of nurses specialized in pediatrics.
14. Conducting constant training of the team of nursing technicians.
15. Designation in institutional protocols, of activities that are particular attributes of nurses as far as medication therapy is concerned.
16. Issue formal nursing orders as regards care in administration, monitoring and follow-up of results of medication therapy in the child.
17. Make available adequate material and equipment for the administration of medications in children.
18. Use of volumetric infusion pumps to promote greater accuracy in intravenous infusions.
19. Implementation of technologies for calculating the dose of medications. (E.g., computerized systems with means to check the calculation of doses).
20. Careful documentation of the process that involves the administration of medications.
21. Education of patients and family members with respect to the treatment implemented.
22. Implementation of automated monitoring systems for detection and warning of adverse events.
23. Reduction in adverse events related to anticoagulant medications.
24. Implementation of a system for the distribution of single doses.
25. Use of warning systems and written protocols for special procedures and use of risk medications.
26. Use of programs with pharmacological data.
27. Pharmacy Center for the preparation and administration of medications.
28. Implementation of a bar code system in the process of medication administration.
29. Standardization of technological equipment and material. (for example infusion pumps).
30. Standardization of scales and systems for measuring the child (E.g. Kilogram).
31. Use of forms that contain specific areas for recording allergies and weight.
32. Facilitate means of communication among health team members.

Source: Miller MR, Robinson KA, Lubomski LH, Rinke ML, Pronovost PJ. Medication errors in paediatric care: a systematic review of epidemiology and an evaluation of evidence supporting reduction strategy recommendations. *Qual Saf Health Care.* 2007;16(2):116–26.

In addition to the specific recommendations for preventing the occurrence of medication errors, in 2001 the American Academy of Pediatrics published the Principles of Pediatric Patient Safety, which are pointed out in Chart 2.⁽¹⁰⁾

Chart 2. Principles of Pediatric Patient Safety

- Work as a team in order to create environments of safe practice and prevent the occurrence of errors;
- Focus on the systemic approach for promotion of the patient's safety, prevention of errors and prepare systems to identify errors and make it possible to learn from them;
- Explore the problems related to dosing errors in pediatrics, especially due to the complexity of their calculation;
- Direct specific actions towards pediatric patient safety and develop care guidelines in order to coordinate intervention actions for promotion of the safety of this group;
- Demand that pharmaceutical industries ensure that medications do not have similar names or similar sounding names;
- Encourage the inclusion of pediatric patients in clinical studies of new drugs;
- Implement safe medication practices based on scientific recommendations;
- Conduct surveys to analyze the errors in pediatrics in order to identify intervention strategies.

Source: Lannon CM, Coven BJ, Lane France F, Hickson GB, Miles PV, Swanson JT, Takayama JI, Wood DL, Yamamoto L; National Initiative for Children's Health Care Quality Project Advisory Committee. Principles of patient safety in pediatrics. *Pediatrics*. 2001; 107(6):1473-5.

FINAL CONSIDERATIONS

There is consensus among professionals in the health area that errors resulting from medication therapy represent a problem that has reached high proportions over the last few decades. In pediatrics, this fact has even greater impact. Therefore, it is a challenge to the

entire institution and health to promote changes in the organizational culture that allow re-structuring of the processes and implementation of safety strategies.

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