Drug therapy for children in emergency hospital service

Terapêutica medicamentosa para criança em serviço hospitalar de emergência

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Abstract

Objective: To assess the knowledge of the nursing staff about drug therapy.
Methods: A cross-sectional study that included the participation of 37 nursing professionals by using a structured and assessed instrument with four scenarios involving drug therapy.
Results: The participants showed uniform knowledge about the drug therapy in all scenarios. However, in the third scenario, a statistically significant difference ($p = 0.003$) was observed among the professionals working in the research institution and studying at the same time, regarding the change of route for medication administration in cardiac arrest situations.
Conclusion: The surveyed nursing professionals have knowledge about the drug therapy directed to the pediatric population in situations of emergency.

Resumo

Objetivo: Analisar o conhecimento da equipe de enfermagem sobre terapêutica medicamentosa.
Métodos: Estudo transversal que incluiu com a participação de 37 profissionais de enfermagem com a utilização de instrumento estruturado e avaliado, com quatro cenários, que envolveram terapêutica medicamentosa.
Resultados: Os participantes demonstraram conhecimento uniforme sobre a terapêutica medicamentosa em todos cenários. Porém, foi possível observar diferença estatística significativa (p=0,003) entre os profissionais que trabalham na instituição da pesquisa e que estudam com relação ao terceiro cenário referente à mudança de via de administração de medicação em situações de parada cardiorrespiratória.
Conclusão: Os profissionais de enfermagem pesquisados possuem conhecimento sobre a terapêutica medicamentosa direcionada à população pediátrica em situação de urgência.

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Introduction

The search for quality in services has been growing in national and international hospitals, and the quality of nursing care throughout the care for patients was intensified in order to minimize failures along the medication system.[1,2]

The medication system is characterized by a dynamic activity with five stages (prescription, dispensing, preparation, administration and monitoring) that are interconnected with each other, in order to ensure patient safety.[3,4]

In pediatric patients, there is greater vulnerability to failures in medication systems due to the specificity and complexity existing in every age group, susceptible to variations in weight, body surface, pharmacokinetic and pharmacodynamic mechanisms, absorption, metabolization and excretion of drugs.[5,6]

It is necessary that nursing professionals have technical and scientific knowledge about the medication system, continuing education in pharmacology and physiology principles, drug administration routes and drug interactions, hence increasing the quality of care and ensuring the safety of patients.[4]

This study aimed to analyze the knowledge of the nursing team about medication therapy.

Methods

This is a cross-sectional descriptive study of quantitative approach carried out in the Children's Emergency Room of a university hospital in the city of São Paulo, in August and September 2012. The sample consisted of 37 members of the nursing team. The nursing professionals performing temporary coverage in the field of study were excluded since they did not have full knowledge about the specifics of the sector.

For data collection, was developed a structured instrument with four scenarios containing care practice situations of the nursing professionals in pediatric emergency, and aiming to emphasize the perception of participants about the drug therapy.

The instruments were evaluated by three external consultants, experts in the area over a period of 30 days. After the content evaluation, there was a pre-test in the pediatric intensive care unit in order to analyze the degree of understanding of the involved professionals in relation to the presentation, clarity and relevance of the instrument, and also to estimate the time required for filling out the instrument completely. The instrument consisted of two parts. The first part presented scenarios with situations related to drug therapy in pediatric emergencies and the clinical practice of the nursing staff. The second part contained questions for the characterization of professionals.

The data were analyzed through descriptive statistics, characterizing the individuals in the study, and presented as tables in absolute and relative frequencies. The chi-square test or the Fisher's exact test (F) were used, considering the significance level of 5% ($p<0.05$).

The development of the study met the national and international standards of ethics in research involving human subjects.

Results

The sample was composed of 19 (51.4%) nursing assistants, nine (24.3%) nursing technicians and nine (24.3%) nurses, predominantly female (91.9%), aged 38 years on average. The members had 11.3 years as the time since graduation and 7.2 years as working time in the institution, on average. Of all participants, 22 (59.5%) presented the research institution as the only formal employment. It is noteworthy that a single (2.7%) professional works in two institutions and studies concurrently. Among these workers, 19 (51.4%) carry out their activities at night, 15 (40.5%) are public employees in statutory regime, and the rest works under a regular employment contract (CLT – Consolidated Labor Laws).

In order to facilitate the reading comprehension, the scenarios on drug therapy were presented in full, together with the responses given by the participants (Table 1).

Table 1. Responses in the scenarios

Scenarios	Yes n(%)	No n(%)	I have doubts n(%)
1) A preschool child aged 4 years, having a seizure, with the prescription of a loading dose of 30mg of intravenous sodium phenytoin. When preparing the prescribed medication, the nursing assistant has knowledge that the particular drug should not be administered in pure form, hence requiring a diluent. As a diluent of phenytoin sodium, the assistant uses 5% dextrose. Is the described conduct correct?	11(29.7)	19(51.4)	7(18.9)
2) An infant aged 1 year and 6 months is taken to the children's emergency in maternal company presenting a condition of vomiting for a day. The medical team prescribed 0.6ml of dimenhydrinate/ pyridoxine hydrochloride intramuscularly. The nursing technician prepares the prescribed medication and opts for the dorsal-gluteal region (gluteus maximus muscle) to administer the injection. Do you agree with the employee's conduct?	18(48.6)	11(29.7)	8(21.6)
3) A 9 year-old child is admitted to the emergency room after the multidisciplinary team starts performing the procedures of Cardiopulmonary Arrest (CPR). There were signs of infiltration in the peripheral venous catheter insertion, opting for its removal. In the absence of available venous network, the medical team prescribes 30 mg of epinephrine via orotracheal cannula. Noting the change in route of administration, the nursing assistant finds no trouble with administering other prescribed medications in the tracheal tube. Is the nursing employee's line of reasoning correct?	2(5.4)	32(86.5)	3(8.1)
4) A preschool child aged 3 years, under intense respiratory discomfort is forwarded to the emergency room, to start rapid sequence intubation. The medical team prescribes the necessary medications for the procedure. During the administration of fentanyl citrate, the nursing assistant performs an IV push of the drug in the peripheral venous access of the patient. In your opinion, was there a failure during the drug administration?	14(37.8)	15(40.5)	8(21.6)

In scenario 1, it was observed that 19 (51.4%) of the nursing professionals responded that the diluent for phenytoin sodium should not be 5% dextrose. However, 18 (48.6%) participants answered that 5% dextrose dilution should be used, or were in doubt. Thus, a slight majority of participants showed appropriate knowledge regarding the medication therapy of not using 5% dextrose as an anticonvulsant diluent.

In the second scenario, concerning the appropriate place of intramuscular administration of medication in infants, 11 (29.7%) of the team members answered that intramuscular medications should not be administered in the dorsal-gluteal region in patients younger than two years. However, 26 (70.3%) participants understood that the administration can be done in this region or had doubts about the correct administration technique. In this scenario, it is clear that a small group of participants has dominion over the proper technique to administer intramuscular medication in infants.

The scenario 3 showed that 32 (86.5%) professionals said that in situations of cardiopulmonary arrest, medications should not be administered in different routes from those described in the medical prescription, although five (13.5%) of them answered yes or had questions. It was evident that the majority of participants has adequate knowledge on the drug therapy used in cardiac arrest and its routes of administration.

In the fourth scenario, 14 (37.8%) participants consider performing a fentanyl citrate intravenous (IV) push in peripheral venous access as failure. However, 23 (62.2%) professionals did not consider it as failure or had doubts about such action. Therefore, it is observed that a minority of participants has demonstrated appropriate knowledge regarding the drug therapy of opioid analgesics used in situations of emergency.

In order to facilitate the reading comprehension, all the aforementioned scenarios, together with the correct answers (yes or no) related to the work scheme followed by nursing professionals are shown in table 2.

Table 2. Correct answers in each scenario

Scenarios	Work scheme				p-value
	Only Works (n=22)	Works and studies (n=7)	Works in two places (n=7)	Works in two places and studies (n=1)	
	n(%)	n(%)	n(%)	n(%)	
1	14(63.6)	3(42.9)	2(28.6)	0(0.0)	0.257
2	7(31.8)	2(28.6)	1(14.3)	1(100.0)	0.360
3	21(95.5)	3(42.9)	7(100.0)	1(100.0)	0.003*
4	10(45.5)	3(42.9)	1(14.3)	0(0.0)	0.411

Fisher p<0.05*

A statistically significant difference was registered by the Fisher's exact test, in the proportion of correct responses among the different work schemes (p = 0.003) compared to scenario 3, which deals with the change in the medication

administration route for tracheal tube in situations of cardiac arrest. There was a lower percentage (42.9%) of correct answers in the group of professionals who 'work here and study', i.e., the participants who work in the research institution and also study showed less knowledge about drug therapy in this particular item, which was less assertive than the others.

Discussion

The study limitations are related to the descriptive approach of the specific scenarios, which restrict the data found. However, the results may contribute that the nursing staff improves the quality of care in the drug therapy used in pediatric patients in situations of emergency.

Regarding the professional category, in the present study it can be observed that the professionals of technical level (nursing assistants and technicians) made up the majority of the sample, followed by nurses.

Given the study results, which showed a higher number of mid-level practitioners comparing to undergraduates, and more nursing assistants than nursing technicians, there may be impairment of the quality of services directed to pediatric patients in situation of urgency.

The analysis of the participants' profile showed predominance of the female gender in the nursing staff members. This fact, coupled with the historical retrospective of nursing, is not different from the results found in other studies.[7]

It was found that most professionals work only in the studied institution, which is regarded as an exception. A recent study observed that the nursing professionals work double hours.[7]

In scenario 1, regarding the use of 5% dextrose solution as a suitable diluent for phenytoin, the results showed that the majority of participants considers the referred conduct inadequate. However there is still a significant number of members who consider the action appropriate or who had doubts about the mentioned situation.

Researchers have highlighted the need for drugs at lower doses and appropriate formulations and dilutions to facilitate the administration in pediatric patients. In a children's hospital, among the non-standard drugs for the pediatric age group, the anticonvulsants were present in 70.3% of prescriptions.[8]

The presence of training on the use of appropriate diluents, addition of electrolytes, drug infusion, as well as the inclusion of a pharmacist in the multidisciplinary team will help to improve the quality of drug therapy and minimize the occurrence of medication errors.[9]

In scenario 2, regarding the administration of dimenhydrinate/pyridoxine hydrochloride intramuscularly in the dorsal-gluteal region in infants, there were records of the surveyed nursing staff not realizing that the attitude of the employee was inadequate. This scenario deals with the absence of specific knowledge by the nursing staff in the intramuscular administration of medication in pediatrics, hence causing faults in drug therapy.

In the intramuscular administration of drugs in infants, the optimal site for intramuscular administration of medication is the vastus lateralis, located in the thigh region. For the administration of medication intramuscularly, the nursing staff should have expertise on the specificities of this route. This is the preferred location because this region does not have nerves and large caliber blood vessels, thus minimizing the occurrence of iatrogenesis.[10]

Researchers say that a skilled nursing staff shall be vigilant in the medication system because this is the last element of the chain, and they also consider the role of each health team member essential for acting in the prevention of medication errors.[11]

The scenario 3 concentrates on the administration of epinephrine and other medications prescribed in the tracheal cannula of patients, when the nursing assistant notices the impossibility of venous access in school children. The vast majority of respondents understood that the line of reasoning of the employee mentioned in the approached scenario was inadequate. Thus, this result demonstrates that the studied nursing team

has knowledge of medications that can be administered via the endotracheal tube in situations of emergency.

Therefore, not all drugs can be administered via this particular route, and the members of the multidisciplinary team must have knowledge about the drugs that can be used via orotracheal in the absence of other available alternatives. The lack of knowledge of pharmacodynamic and pharmacokinetic mechanisms, associated with errors in preparation and routes of administration, are some of the factors that may contribute to the occurrence of medication errors in situations of emergency.[7]

Therefore, the mistaken administration of medications that do not have a favorable mechanism of action in the orotracheal route can result in harm to the patient. Studies corroborate the findings by recording that in situations of medical emergencies such as cardiac arrest, pharmacotherapeutic interventions are often needed, and when such interventions are not performed properly, they can result in adverse events or mild to fatal medication errors.[12,13]

In scenario 4, regarding the completion of a fentanyl citrate IV push in peripheral venous access of patients during the rapid sequence of orotracheal intubation, a minority of participants understood that the drug administration in the form of IV push is inadequate. Therefore, the majority of the surveyed staff has no knowledge that the fentanyl citrate should be administered slowly and not by IV push, or had doubts about the correct form of drug administration.

To corroborate the situation represented in this scenario that explores the failure to administer the opioid analgesic in form of IV push rather than the slow bolus, the researchers have recorded 19.1% of failure incidence in the medication system, with errors in drug preparation as the most common, followed by incorrect intravenous administration.[14]

The Institute for Safe Medication Practices describes fentanyl citrate as a high alert drug, that is, a drug with high risk of causing significant injuries to patients when used incorrectly. The mentioned institution recommends specific care for its storage, prescription, dispensing, preparation and administration. In addition to recommending warning mechanisms for its prescription and the double-checking before its administration.

In scenario 3, on the administration of epinephrine along with other prescribed medications via orotracheal tube, there was a statistically significant difference in the variable of work scheme. This scenario illustrates that the nursing professionals who worked in the research institution and studied concurrently had less knowledge about the drug therapy, when compared to other professionals with different work schemes.

In the data collection instrument there were no questions about which type of course the participants were taking. However, it is assumed that if the course was related to health, the level of knowledge about drug therapy could be improved. Researchers believe that the professional training through courses related to medication calculations and basic pharmacology, offered by the continuing education service of the institutions, is essential for the nursing staff.[7]

Conclusion

The nursing professionals surveyed have uniform knowledge about the drug therapy directed to pediatric patients in situations of emergency.

Collaborations

Macedo GPOS contributed the project design, data collection and interpretation, data analysis, article writing and critical review of the relevant intellectual content. Bohomol E contributed the project design, interpretation, data analysis, article writing, critical review of the relevant intellectual content and final approval of the version to be published. D'Innocenzo M contributed the project design, article writing, critical review of the relevant intellectual content and final approval of the version to be published.

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