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RESEARCH

Assessment of the preparation and administration of oral medications to institutionalized children

Avaliação do preparo e da administração de medicamentos orais às crianças institucionalizadas

Evaluación del preparo y de la administración de medicinas orales a los niños institucionalizados

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ABSTRACT

Objective: to evaluate the preparation and administration of oral medications to institutionalized children by nursing professionals. **Method:** quantitative study, developed from August to September 2016, in a shelter in Fortaleza, Ceará. 323 observations of preparation and administration of oral drugs were carried out. Interview and non-participant direct observation of the process of drug administration were performed, whose data were analyzed through descriptive statistics. **Results:** Of the 29 actions of preparation and administration of the drugs, ten were considered satisfactory. Sanitizing of hands before touching the pills occurred in only 5.2% of the observations and cleansing of the bottle for liquid drugs was performed in 23.8%. The actions "check the right child"; "checking medication with the prescription", and "check the right dose" obtained percentages below 15%. **Conclusion:** measures recommended by the literature for the administration of medication were not, in their clear majority, followed, making specific training and protocols necessary.

Descriptors: Institutionalized Child; Oral Administration; Pediatric Nursing; Institutionalization; Nursing Care.

RESUMO

Objetivo: avaliar o preparo e a administração de medicamentos orais por profissionais de enfermagem a crianças institucionalizadas. **Método:** estudo quantitativo desenvolvido em agosto e setembro de 2016, em um abrigo de Fortaleza, Ceará. Foram realizadas 323 observações do preparo e da administração de medicamentos. Realizaram-se entrevista e observação direta não participante do processo de administração dos medicamentos, cujos dados foram avaliados pela estatística descritiva. **Resultados:** dentre as 29 ações do preparo e da administração dos medicamentos, dez foram consideradas satisfatórias. A higienização das mãos antes de tocar em comprimidos ocorreu em 5,2% das observações e a limpeza dos frascos de medicamentos deu-se em 23,8%. As ações "conferir a criança certa"; "conferir o medicamento com a prescrição" e "verificar a dose certa" obtiveram percentuais inferiores a 15%. **Conclusão:** medidas recomendadas pela literatura para administração de medicamentos não foram, em maioria, adotadas, tornando-se necessários treinamentos e protocolos específicos.

Descritores: Criança Institucionalizada; Administração Oral; Enfermagem Pediátrica; Institucionalização; Cuidados de Enfermagem.

RESUMEN

Objetivo: evaluar el preparo y la administración de medicinas orales por profesionales de enfermería a niños institucionalizados. **Método:** estudio cuantitativo desarrollado en agosto y septiembre de 2016, en un refugio de niños de Fortaleza, Ceará. Fueron realizadas 323 observaciones del preparo y de la administración de medicinas. Se realizaron encuesta y observación directa en el participante del proceso de administración de las medicinas, cuyos datos fueron evaluados por la estadística descriptiva. **Resultados:** de entre las 29 acciones del preparo y de la administración de las medicinas, diez fueron consideradas satisfactorias. La higienización de las manos antes de manosear las pastillas ocurrió en el 5,2% de las observaciones y la limpieza de los frascos de medicinas se dio en el 23,8%. Las acciones "verificar el niño bien"; "verificar la medicina con la prescripción" y "certificar la dosis

correcta" obtuvieron porcentuales inferiores al 15%. **Conclusión:** medidas recomendadas por la literatura para administración de medicinas no fueron, en su gran parte, adoptadas, convirtiéndose necesarias las capacitaciones y los protocolos específicos.
Descriptores: Niño Institucionalizado; Administración Oral; Enfermería Pediátrica; Institucionalización; Cuidados de Enfermería.

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INTRODUCTION

The Institutional Housing Unit (IHU), also known as shelter, is intended to provisionally host children and adolescents who are away from family coexistence due to abandonment, or whose families and guardians are temporarily unable to fulfill the functions of care and protection[1].

As there are children with diseases and injuries at the time of referral to the shelters, situations that can be associated to poverty and family neglect experienced from birth, the use of medications is a common practice in these institutions[2-4].

In the IHU, the most used route of administration is oral. Although the oral route has some limitations – including the influence of factors related to the absorption in the gastrointestinal tract, such as foods and other drugs –, it is generally the most convenient and often also the most secure and economic process. It is therefore frequently used[5-6].

Administering medications orally, albeit simpler and less invasive, requires a series of complex care, demanding from the nursing team the competence and technical knowledge on the pharmacological properties of the drugs to be administered.

Different features on the pharmacokinetics and pharmacodynamics of the medications, as well as the proportions of body fat, protein, and extracellular water content between diverse age groups, cause disparity among safety profiles for medications administered to children and adults[7].

In Brazil, the nurse is the professional responsible for medication administrations; nursing team leader, this specialist assumes a key role both in the care for patients under drug therapy as in the dissemination of knowledge on this practice for the team[8]. It should also be acknowledged that the nursing team represents the last barrier of the medication system to identify and intercept errors[9], thus promoting safety in the drug administration.

However, a study about medications in children determined that the most frequent errors occurred during the drug administrations[10]. An exploratory study on the health care of children in an IHU, held in Ribeirao Preto, Brazil, found that the administration of medications was being performed by an employee without specific training, even though there were nursing technicians and assistants in the unit[2]. This can be pointed to as a condition generating safety risk in the process of drug delivery to the institutionalized child.

Then, we highlight the need to evaluate the process of drug administration in these institutions, as such practice occurs predominantly in non-hospitalized patients and because the study on medication errors in this scope are scarce[11-12].

Given this context, this study was justified by the importance in assessing the preparation and administration of medications in an IHU, to verify the actions performed by nursing professionals to ensure safety to the institutionalized children.

So, we posed the following question: how are conducted the oral drugs' preparation and administration by the nursing professionals in a pediatric IHU?

OBJECTIVE

To evaluate the preparation and administration of oral medications by nursing professionals to institutionalized children.

METHOD

Ethical aspects

The research project was submitted to Brazil Platform, being then sent to the Research Ethics Committee of the Federal University of Ceará, in compliance with the ethical aspects of the Resolution No. 466 of December 12th, 2012, of the National Health Council[13]. After approval, the project was presented to the study subjects and, shortly thereafter, the two copies of the informed consent form were signed – one was given to the participants and the other remained with the researchers.

Study design, location, and period

Descriptive study, with a quantitative approach, carried out in a state shelter of Ceará for children from zero to seven years of age, between August and September 2016.

The institution studied had a multi-professional team consisting of eight nurses, seven technicians, and two nursing assistants; five physical therapists, one occupational therapist, two social workers, a nutritionist, a psychologist, a pedagogue, and 67 caregivers/educators.

During the study period, 88 children were sheltered in this institution, but only 33 of them used oral medications continuously.

Sample, inclusion and exclusion criteria

For the sample calculation, we requested from the service responsible for administering medications in the institution the information about the number of oral drugs doses, thirty days before the data collection. Sample size was calculated through the formula for infinite populations. The appropriate proportion of medication delivery was fixed in 50%, with a 5% significance level and 10% of relative error.

Observations on the preparation and administration of medications were included only when they happened orally, as this was the most common route used in the institution, thus excluding observations regarding epicutaneous, inhalational, intravitreal, aural, rectal, and intramuscular administrations that occurred at the institution during the study. Drug preparations and administrations performed by caregivers/educators were also excluded.

Therefore, the study samples consisted of 323 observations of oral drugs preparations performed by nursing professionals, among technicians and assistants, of the institution studied.

This sample represents more than 40% of the doses informed by the nursing team, a percentage calculated based on the average of preparation and administration errors in other Brazilian studies[14-15].

Study protocol

For data collection, two methods were used: interview, with the implementation of a script to identify the socio-demographic characteristics of the professionals participating; and non-participating direct observation of the oral drug delivery process through a checklist devised by the authors, according to recommendations and support of the literature[16-17].

Data collection was performed by three nurses of the Research Group on pediatric care of the Nursing Department in the Federal University of Ceará, to ensure no observation would be carried out by only one nurse.

The interview was conducted on an individual basis, performed as the nursing professionals were invited to participate in the study, and after the signature of the informed consent form.

We used the convenience sampling technique consecutively since the researchers stood to wait for the studied event to happen and, procedurally, observed and registered the progress of the activities.

Also, the non-participating direct observation was used, which has proved to be a reliable and precise technique to obtain data related to medication errors since it allows the observation of the phenomenon at the time of its occurrence and enables the collection of information that would be impossible to obtain through secondary records[18].

The checklist used during the monitoring of the preparation and administration of oral drugs comprised 29 actions, divided into four steps: Reading of medical prescription (three actions); Hand sanitization (two actions); Material and medicament preparation (eleven actions); and Administration of medication (thirteen actions). Each action comprised two alternatives, yes and no, and the observer noted the alternative which corresponded to the action observed.

Preparations were conducted in a room intended for nursing procedures, in which there was a countertop for medication arrangement, being these organized by class in wall-mounted cabinets. There was also a sink for washing hands and a fridge for the conservation of diluted medications.

Results analysis and statistics

For data organization and assessment, the program Microsoft Excel 2010 was used. Results were analyzed through descriptive statistics, presented in the form of tables and discussed from the literature pertinent to the subject.

Regarding the distribution of actions developed in the preparation and administration of oral drugs, according to the performance assessment, it was considered satisfactory the performances whose overall median score was equal or greater than 70% hits for each action[19].

RESULTS

Observations were carried out with all the professionals in the technical and assistance levels of the institution, who were responsible for the preparation and administration of oral medications. The participants presented the following socio-demographic characteristics: all were female (100%), from 28 to 56 years of age and 3 to 20 years of experience in pediatrics, totaling seven technicians and two nursing assistants. It should be noted that nurses were not included in the sample since none of them performed oral drugs administrations during the study period.

Only two nursing professionals had a monthly workload inferior to 120 hours, as they were state employees, and most (7) worked as a third-party service, with 144 monthly hours. Regarding work shift, four professionals worked during the day, three worked nightly, and two in mixed periods. It is noteworthy that the professionals worked only on the institution studied, and that in all the moments of data collection there was only one nursing assistant or technician in the institution, in addition to a nurse.

Among the 88 institutionalized children in the study period, eleven were infants (29 days to 2 years of age), thirteen children (two to six years old), and nine schoolchildren (six to ten years of age). There were 33 children using continuous medication, orally, of which seventeen were female and sixteen were male, and 36% had more than one medication prescribed at the same time.

Among the 323 observations of medication preparation and administration, 285 (88.2%) were of liquid drugs and 38 (11.8%) of pills; in 148 observations there was more than one medication prescribed for the child at the same time (45.8%).

Classes of the used medications were: gastrointestinal motility modifiers (16.1%), vitamins (14.9%), expectorants (13.9%), psychotropic drugs (13%), bronchodilators (10.2%), antiasthmatic (8.9%), antianemic (8.7%), antibacterials (5.6%), antiparasitic (5%), and corticosteriods (3.7%).

The professionals used disposable or reusable plastic cups to put the medications, which were arranged in organizing boxes with thirty divisions, as the preparation was performed. In each division of the organizing box, a labeled tape indicated the first name of the respective child. The disposable cup with the medication was placed in the partition labeled with the first name of the child, however, no identification was placed in the cup, such as the name of the medication, dosage, and schedule.

After the preparation of the medication prescribed for each time, the same technician/nursing assistant took the organizing box with the medications to administer them to the children.

Table 1 shows the distribution of results according to the assessment of the step Material and Medication Preparation, displaying actions considered satisfactory and unsatisfactory. Were considered satisfactory the performances whose cut-points were equal or greater than 70%[19].

Results of the step Reading of Medical Prescription, after assessing the three actions related, were: reading of the prescription, performed in all observations; most professionals can understand the writings of the prescriptions (in only 3.7% the professionals had doubts regarding the writing, the others asked the nurse present if they did not understand any spelling); and in all observations the name of the child is checked with the prescription.

Table 1 – Distribution of the three steps and sixteen actions developed in the process of medication preparation for oral administration, according to the performance assessment

Medication preparation for oral administration		n	%
Step – Reading of medical prescription:			
Actions	Reads the prescription;	323	100
	Understands the writings of the medical prescription;	311	96.3
	Checks the name of the child in the prescription.	323	100
Step – Hands sanitization:			
Actions	Before the preparation of the medication;	148	45.8
	Before the administration of the medication.	94	29.1
Step – Materials and Medication preparation (n = 323):			
Actions	Performs countertop cleanup and organization;	311	96.2
	Checks the name on the medication label with the medical prescription.	234	72.4
Liquid medications (n = 285)			
Actions	Uses syringe or dosing cup for a proper milliliter measurement;	285	100
	Concocts the liquid medication by shaking the bottle before administration (only when the medication is not in a proper volume unit dose);	134	47.1
	If the medication is in multiple-dose vial, removes the lid and places it upside down on the work surface, avoiding flask contamination;	37	12.9
	Wipes the medication bottle mouth with a paper towel and covers the bottle again;	68	23.8
	If there is more than one medication, puts them separately in the disposable cup (n = 148).	76	51.3
Pills (n = 38)			
Actions	When using blister-type packing, removes the medication by "bursting" the blade or the coating paper and places it in a disposable cup, without touching the pill;	4	10.5
	Parts only pills that are grooved by the manufactures beforehand;	9	23.8
	When necessary to part the pill, uses clean or gloved hand, or pill cutter;	2	5.2
	In case of difficulty to swallow, grinds the pills separately.	11	28.9

Table 2 – Distribution of the thirteen actions developed in the step Oral Administration of the Medications, according to the performance assessment

Step - Medication administration orally		n	%
Liquid medications and pills (n = 323)			
Actions	Takes the medication to the children 30 minutes before or after the prescribed times (according to the norm of the institution);	273	84.5
	Correct administration route;	323	100
	Correct administration record;	231	71.5
	Checks the right child;	14	4.3
	Checks the medication with the prescription;	8	2.4
	Check the right dosage;	5	1.5
	Guides child/responsible;	27	8.3
	Administers immediate prescription medication at the right time;	18	5.5
	Allows the child to hold the drugs on hand or put them in the cup before inserting them on the mouth;	24	7.4
	Does not rush to administer the medications;	173	53.5
	Remains next to the child until the it ingests the medications;	12	3.7
	Asks the child to open the mouth, if unsure that the medicine was swallowed.	9	2.7
Pills (n = 38)			
Action	Provides water to help the child swallow the pills;	38	100

Concerning hand sanitizing, the procedure lasted less than 40 seconds, just as there were not carried out the steps for a correct hand hygiene, as recommended by the Ministry of Health [17]. The use of adornments was present at 90.1% of the observations.

It is important to emphasize that the solution available for hand sanitizing in the institution was common liquid soap, not a 70% alcohol preparation.

Of the eleven actions recommended for the step Material and Medication Preparation, we noticed that cleaning and organization of countertop is performed by 96.2% of the professionals; 72.4% compares the name in the medication label with that in the prescription, and all used syringe or dosing cup to properly measure milliliter. Thus, the percentage of this actions was satisfactory, being $\geq$ 70%.

Table 2 presents the step Oral Administration of Medications and its respective actions.

Among the actions of the step Oral Administration of Medication, only four have achieved a performance percentage greater than 70%, which were: Takes the medication to the children 30 minutes before or after the prescribed times (84.5%); correct administration route (100%); correct record of administration (71.5%); and provides water to help the child swallow the pills (100%).

Finally, it was found that ten (34.4%) of the 29 actions observed, which compose the preparation and administration of oral drugs, were satisfactorily performed.

DISCUSSION

In long-stay institutions, it is common that several residents receive medication in the same timetables, some of them equal or similar, but in different doses[20]. Equivalent results were found in this study, in which the same professional prepared and administered the medications, at the same time, to many children, which may have influenced the low adherence to hand sanitization.

An observational research conducted for six months, from 793 observations of the hand sanitization technique in the five moments recommended by the World Health Organization, found that in 446 (56.2%) of the observations, this procedure was not performed[21]. This is consistent with the findings of this study, with 45.8% of adherence to the procedure before the preparation, and 29.1% before drug administration.

This situation becomes worrisome since, similarly to what occurs in children's hospitalizations, the institutionalization requires from the nursing professionals a greater proximity to the child, to meet the demands of care and, consequently, there is a greater need for hand hygiene[22].

In this study, care with hand hygiene before touching the pills (5.26%), cleaning of the medication bottles (23.85%), and the concern in not to put the bottle lid in contact with the surface (12.98%) were unsatisfactory.

The study performed in a pediatric unit of Minas Gerais, Brazil, corroborates such findings, as it was observed then that, in all the cases in which was necessary to part the pill, the hand sanitization was not performed before touching it (10.5%), also, bottles and vials were not properly disinfected (31.2%)[23]. It is worth noting that there is a consensus among field researchers regarding the severity of such errors, which can compromise the effectiveness of drug therapy in children[24].

Another important aspect observed in this research should be emphasized: the absence, in all observed doses, of identification with name, dosage, and time schedule of the medication in the cup where the pills or liquid drugs were put or prepared. Added to this fact, the identification of the medication was performed only with the first name of the child, which was posted on the divisions of the organizing box where the cups were stored.

Results like these were found after 373 observations of the drug administration in an inpatient pediatric unit in southern Brazil. The identification of the child in the medication label was made only with the first name in 88.2% of the oral administrations. We also found that no safety strategies were used in the child identification before the administration of medications, with no data standardization[25].

This problem may be related to the fact that, usually, the children stay in the Pediatric Housing Unity for considerable periods of time, which generates greater familiarity and recognition of the children by the professionals[1]. However, the need for adopting practices that enhance the safety of the pediatric patients must not be neglected, such as identification of the medication prepared with the full name of the child and of the drug; dosage, administration route; initials of the person responsible for preparation; and time of administration[17,26].

In this study, we also perceived that there were many children under the responsibility of the same nursing professionals, in disagreement with the resolution No. 543, of April 18th, 2017, of the Federal Council of Nursing, which emphasizes that for each four pediatric patients under six years of age inserted in the intermediate care demand should be one nursing professional responsible[27]. Non-compliance with this recommendation can disturb the adoption of practices that promote patient safety in the IHU.

Patient safety, in the context of this research, can be promoted from the execution of the "nine corrects" in the drug administration, namely: correct patient, correct medication, correct route, correct time, correct dosage, correct record of administration, correct guidance, correct form, and correct answer[17].

Regarding correct dosage, in this study we observed the partition of pills not previously grooved by the manufacturer (76.31%). A research conducted with 108 pediatric nurses of a university hospital in Turkey reinforces such findings, as it evaluated the preparation and administration of 406 oral drugs and identified that the process of parting the pills into appropriate doses was the difficulty most commonly reported by professionals (45.3%)[28].

Non-grooved industrialized pills are the most reliable way to obtain the desired concentration of the active ingredient, and the partition of such medications is a risk for the administration of doses that do not correspond to the prescribed dosage, which can compromise the effectiveness of the treatment[29].

It is important to highlight that the lack of drugs developed specially for pediatric use hinders the safe preparation and administration of medications, increasing the need for

manipulation and re-dilutions, in addition to often present inappropriate dosage[6,30].

Another study result that should be emphasized was that, of 148 observations, there was more than one medication prescribed at the same time for the same child and, in 51.3% of these cases, the drugs were placed in the same disposable cup, when the recommended is that they should be prepared and stored in different containers. With this, the risk of drug incompatibility increases through physical or chemical reaction between two or more medications *in vitro* before they reach the bloodstream when the solutions are concocted in the same syringe, vial, or flask[31].

Study limitations

A limitation of the study was the fact it was conducted only in one child housing unit, thus not allowing generalizations. Therefore, further research is needed, which aim to evaluate the health care provided to institutionalized children, to identify more precisely the difficulties encountered by professionals who assist them.

Contributions to the Nursing field

The research made it possible to demonstrate the importance of developing practices to strengthen the safety in the drug administration to institutionalized children, a topic still little discussed on the literature, thus contributing to the optimization of the health care for this group.

CONCLUSION

Difficulties were identified regarding the managing of aseptic care by the nursing professionals when performing the steps of the oral administration of medications to institutionalized children, such as hand sanitization before touching the pills and preparing or administering medications.

It was also possible to identify gaps concerning patient safety with regard to: the incorrect identification of the drug after preparation, with absence of the name, time schedule, and dosage; incomplete identification of the patient, using only the first name of the child in the organizing box where the medications were prepared; improper storage of the drugs to be administered at the same time for the same child, which were separated in the same disposable cup.

We reaffirm, therefore, the need for further research on the health care to institutionalized children that seek to identify risk generating conditions and to support the elaboration of strategic plans, secure care routines implementation, and the development of professional competences in these institutions.

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