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MEDICATION ADMINISTRATION ERRORS IN NEONATAL INTENSIVE CARE UNITS[1]

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ABSTRACT
Drug therapy is responsible for most of the errors occurred during the health care, and medication errors are the most frequent and severe. The present study identified the type and the frequency of errors in the administration of intravenous medications in two Neonatal Intensive Care Units. This is a cross-sectional research of observational nature performed by systematic direct observation of medication administration process. Data collection occurred in the second half of 2012 from the observation of 100 doses of intravenous drugs. The errors of medicines administration showed frequent, and the most observed were the incorrect technic administration (51%) and error time (16%). It concludes that there is need of the incorporation of a culture of safety by the part of the institutions and health professionals that in them act for decrease the rates of errors and ensuring patient safety.

Keywords: Medication errors. Newborn. Patient safety. Nursing care.

INTRODUCTION

Drug treatment is responsible for most of the errors occurred during the provision of health care[1], and medication errors are more frequent and more serious when they involve neonatal patients compared to adult patients[1-2].

Research that assessed the reported incidence, causes and medication error reporting in intensive care units (ICU) and wards of Jordan's teaching hospitals in 2010 showed that the average incidence of medication errors for the entire sample was 35%, and 36,4% in the ICU and 33,8% in the wards[3]. In regard specifically to errors of administration of drugs in health care settings, the rates reach up to 59,1% of total error opportunities[4] and in the critical care units alcançam72,5%[5].

Research carried out with nurses in Intensive Care Units Neonatal and Neonatal Units of five teaching hospitals of Shahid Beheshti (Iran), revealed that 37,8% of participants had committed one to two medication errors in the last six months. Among the errors involving injectable medication administration the most frequent were: time errors, dose miscalculations and drug interaction[6].

Integrative literature review that identified the publications available on incidence, related factors, consequences and/or mechanisms for the prevention of medication errors in Neonatal Intensive Care Units (NICU), showed that the occurrence of this type of error is high and often associated with communication problems, prescription, lack of standardization of formulations and doses for newborns[7].

The NICU is a sector in which medication errors deserve special analysis due to the complexity of drug therapy used; the use of many potentially dangerous medications and clinical severity and instability of patients. In addition, newborns (NB) in this environment have characteristics that make them more vulnerable to error, and no matter how committed the fault, the error occurred has great potential to bring severe complications for the patient's life[8].

Whereas the nursing staff has an important role in drug therapy, since it is responsible for the preparation and administration of medicines, its professionals must possess skills and expertise to build barriers able to detect the error before it reaches the patient, ensuring

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error safe and free care[9]. Giving the above, the objective of this study was to identifying the type and frequency of errors occurring in intravenous drug administration step in two NICUs.

METHODOLOGY

It is a survey of cross-sectional design and observational nature carried out in two NICUs, one public and one private, from the city of Cuiaba, MT, and the public hospital is part of the Sentinel Network of ANVISA.

As it is two intensive care units with very different demands on the number of patients and consequently the amount of medications taken, it was decided to set as sample unit of study to evaluate the error, the number of doses applied medications. Thus, so that it could analyze equally the institutions, observing the intravenous administration of 50 doses of medication for each unit studied was predefined. The option only for intravenous drugs was made because of drug therapy in NICU occur almost entirely in this way, beyond that require professional a specific set of theoretical and practical knowledge and be the way with the most potential for serious and fatal errors . The sample was given for convenience, and the observed doses were prepared and administered by more than one worker.

To analyzing medication errors there was used the definition of the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP), which characterizes it as any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is under control of the healthcare professional, patient or consumer. Such events may be related to professional practice, health care products, procedures, systems, including prescription, communication, labeling, packaging and nomenclature, dispensing, distribution, administration, education, monitoring and use[10].

Thus, administration errors were classified as errors of omission; errors in the administration of a non-prescribed drug; errors regarding the route (administration by the wrong route or different from that prescribed); errors due to incorrect time (administer the medicine out of the appointed time, with half-hour limit more or less); and errors due to the use of incorrect techniques of drug delivery (failures in aseptic techniques/hand washing, no prescription conference at the time of administration, contamination of material and/or drug (with no perceived by the professional action and do not dispose of dose), and incorrect punch (inappropriate location, improper device and lack of local antiseptic)[10-11].

Data were collected in two stages, the second half of 2012, the researcher and a graduate student nurses trained previously. The first stage was carried out systematic non-participant observation during the administration of medications. This observation was directed by adapted instrument of study in a public teaching hospital in the city of Rio Branco, AC, belonging to the ANVISA[11] sentinel network and contained medication administration environment data; the drug (dose); the patient; practitioner administering and the procedure performed.

The second stage consisted of data collection from medical records of newborns in which the medication was observed and took the end of each day of observation in order to comparing what was done during the administration of medicines and identifying the occurrence of errors. For this we used a structured questionnaire developed by the researchers with data on the prescription of medications observed, nursing care medicines and nursing notes.

For analysis of the results we used the Donabedian's framework for assessing the quality of health services, which covers three dimensions: structure, process and outcome[12]. The analysis of the structure is related to the material, human, physical and financial resources to provide health care. In this research, were first observed external elements to the professionals (physical and material resources) that could directly affect the quality of medical process leading to a medication error, they are: ambient lighting, noise level at the time of administration of the medication, interruptions, site facilities for hand hygiene (wash basin with no manual override lock, soap, antiseptic, and resource for drying hands), and

the cleanliness and organization of the environment.

The process corresponds to the evaluation of the activities developed by health professionals, considering the technical and interpersonal relationships. The size result reflects the effects of assistance to the user's health, as well as changes related to knowledge and behavior of people and patient satisfaction[12]. We opted for the use of this framework for organizing and analyzing the data to understand which the best is suited to the hospital medication system. The resulting data were stored in Microsoft Excel 2010 software and received descriptive statistical treatment.

The project was approved by the Research Ethics Committee under Opinion #36189 CEP/2011. It was provided free and informed consent for nursing professionals who agreed to participate in the study, and guaranteed the anonymity of the subjects and of the institutions surveyed. For study purposes, UTIN1 and UTIN2 were named to identify the respective participating units.

RESULTS AND DISCUSSION

The data used in this analysis will be presented in three dimensions: structure, process and outcome.

Dimensionof the structure

It is known that some aspects related to medication administration environment of the structure can have a negative influence in this process, creating a loophole in the system for the occurrence of error.

The aspects of the analyzed structure were inadequate lighting in nearly one third of the doses observed in the NICU 1 (Table 1).

Table 1. Inadequacies of the environment during the process of administration of medications into two NICU of Cuiaba, MT; 2012.

Items observed	NICU 1 (n=50)		NICU 2 (n=50)		Total (n=100)	
	N	%	N	%	N	%
Lighting	14	28,0	-	-	14	14,0
Interruptions of the procedure	03	6,0	04	8,0%	07	7,0
Noise level	01	2,0	-	-	01	1,0

Source: The authors.

Insufficient lighting can hinder the implementation of the procedure as difficult to read labels and records, thus influencing the occurrence of medication errors[13]. It is noteworthy that in the case of UTIN1, is a common practice that the light remains off when it is not performing care in newborns so that they can enjoy a better standard of sleep and rest. This measure is commendable because humanizes the environment, however, it should be noted certain limits so as not to undermine the direct care with medication, and ensure the safety and quality of procedures.

With regard to interruptions and noise during medication administration, staff should be encouraged to eliminate attitudes like these because the professional needs to be focused and concentrated in the ongoing process so that it can be performed safely and quality, reducing the risks for the patient.

Regarding the site for hand hygiene in the environment of drug delivery, despite the two institutions having the space did not meet every requirement, for in UTIN1 the lavatory has manual closing, which is inadvisable when seeking proper hygiene to decrease the infection rates. It is known that proper hand hygiene is the primary measure to reduce intra-hospital infections and increase patient safety[14].

Regarding the cleanliness and organization of the environment was obtained satisfactory result because both units had to be adequate in these aspects. It is important that the environment is organized and clean to ensure the safe handling[13].

Dimension of the process

As the two units showed considerable differences in medication administration processes, we chose to present them through flowcharts. Figures 1 and 2 respectively represent the medication administration process in UTIN1 and UTIN2. From the presented flowcharts, we highlight some points of the processes that are directly linked to patient safety.

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Because nursing be responsible for the system end, it is necessary that it is well prepared to detect errors arising from other processes and found no barriers to prevent its occurrence. So it is a very important step and it has to be structured in an exemplary manner to ensure a secure system.

With respect to nursing, despite the law of professional practice press for more complex practices, it should be carried out by nurses, day-to-day assistance what is observed in many Brazilian health institutions is that nurses, technicians and nursing assistants have the same powers in drug therapy performed in children without increasing the dimensions of nurses to carry out this practice, which can contribute to several medication errors reaching pediatric patients[15].

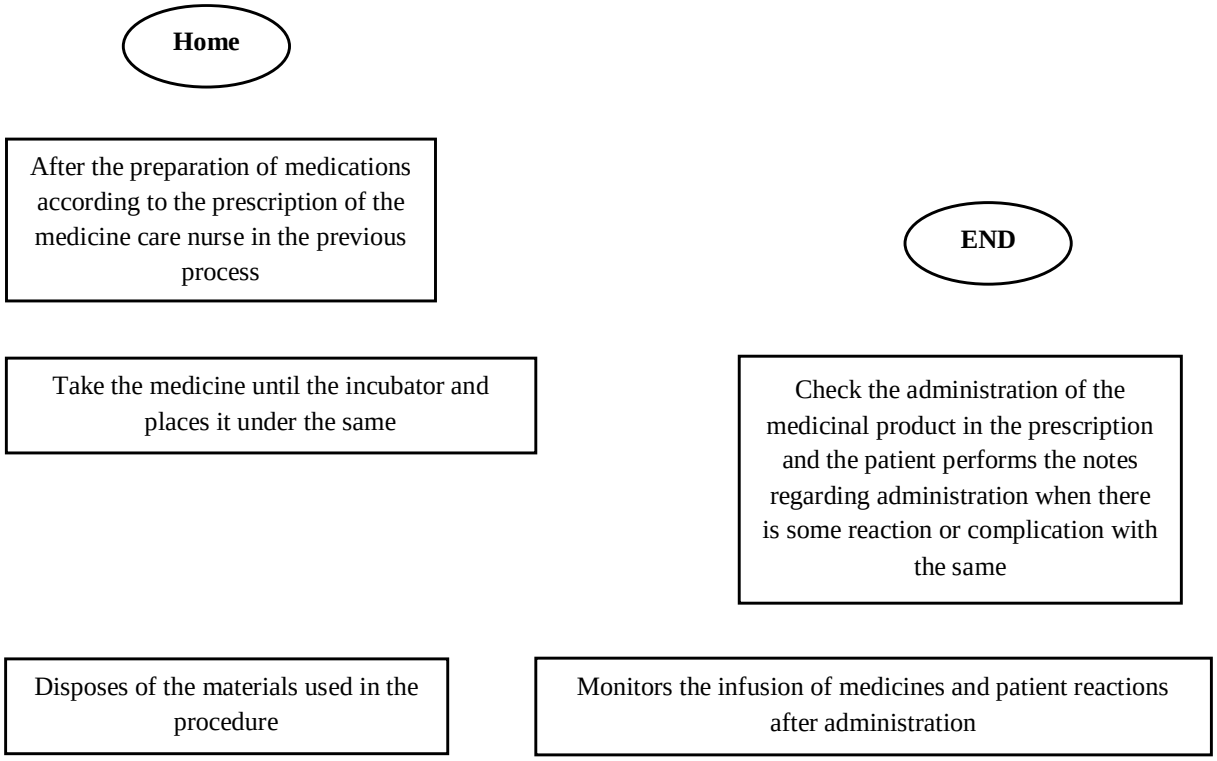

Figure1. Drug administration flowchart in NICU 1.

To critically analyze the medication administration process of the NICU in question, it is clear that although they are very similar they differ in a fundamental step towards patient safety, the conference of the drug to the patient. In UTIN2, as the drugs were labeled in the preparation process, to reach the bed of the patient, the nursing technician performs the conference to make sure the medication is correct by checking the label written patient's name agrees with the identified name in the incubator.

Such action has already been configured as a security barrier, but it could be more effective if it were also given to the prescription. Indicates, therefore, a three-way conference, as it were, the label on the medicine, the patient's name on his bed and that the prescription medication, preventing it more effectively errors.

In the UTIN1 for failing to label medicines at the time of preparation, this conference is not held and thus there is no barrier to prevent some errors from reaching the patient. As

stated previously, it is necessary minimum actions, and if so inexpensive to take effect. Therefore, it is recommended that it be implemented in UTIN1 this conference in the act of administering the drug; to this end, the label can only be done in the medication preparation process.

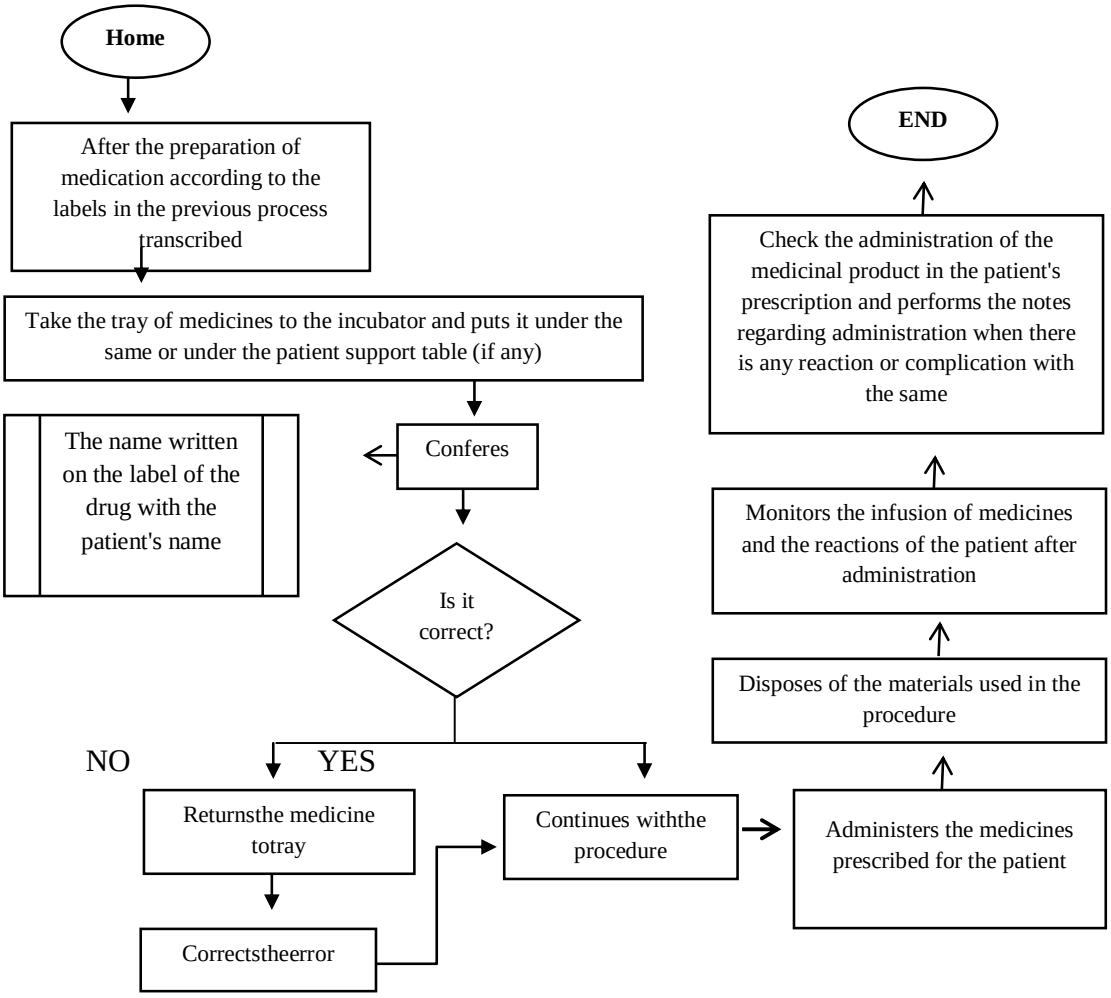

Figure 2. Drug administration flowchart in NICU 2.

The team communication failures are very common when it comes to medication administration can lead to errors[7], and as is the case of the extra dose administration of medication errors and drop. These errors can be generated by not checking the patient's chart before administering certain medication, and is configured as a communication failure[13]. To reduce this type of error, it is important to read the labels of medicines, check with the medical prescription the medication label prepared with the patient's name, bed number, name of the responsible professional, and route of administration, dose and schedule. It should also be seen in the chart if the medication to be administered has not been suspended[13].

Another aspect observed was that the monitoring of the effects of drugs on the patient was just a simple step of drug delivery process in both the NICU and not a separate process as recommended for the system. This

situation indicates a lack of awareness of professionals regarding the importance of such action for patient safety and efficacy of treatment, since often this step ends up being ignored by professionals who monitor the effects only when these appear prominently after administration of a drug, or when there is undesirable reactions.

During the observation, we found that the patient monitoring up to 15 minutes after drug administration to monitor and act for possible undesirable reactions occurred in 73,0% (73) cases, and in UTIN1 this occurred in 54,0% (27) of the time, and UTIN2 this rate reached 96,0% (46). It reaffirms that such care is only seen as a step in the medication administration process and not as a process in itself as it is desirable. Whereas this step is not performed at all doses administered, which sets up a serious flaw, since it is the last barrier to quickly detect the error occurred and intervene preventing further damage to patients. Nevertheless, when compared to a study conducted in 2012 in the pediatric unit of a hospital in Minas Gerais, our result was slightly more satisfactory, since in this hospital 100% of the doses there was monitoring of the patient after administration of the medicament[16].

Systematic observation of the medication delivery process showed some steps are no longer satisfied in certain doses or even that are not made. One example is the query to the prescription prior to administering the drug. It is noteworthy that the only place where it was recorded was in UTIN2, where the 50 doses observed in 24,0% (12) of the time the professional who administered the medicine consulted the prescription for conference before giving it. In UTIN1 this did not occur in any time during the administration of the 50 drug doses.

Still, after the end of the action of administering the drug to the patient in 72,0% (72) of the time the professional checked the records immediately after the action performed. When analyzing separately each institution, it was noted that this occurred more frequently in the UTIN2, since this unit this rate reached 90,0% (45) of the time. In UTIN1, the frequency was 54,0% (27) of the time. It reinforces the need for such action to be followed in the institutions. Besides the correct documentation, the fact check the records shortly after drug administration prevents mistakes are made and other professional administer the medication again, and keep up to date at all times the patient's record so that in case of any complication can act as soon as possible and without doubts.

Dimensionof the result

From the systematic observation of medications administered doses, and the consultation of these prescription of the records of newborns can reach the number of errors during the medication administration process according to their type.

In Table 2 we note that the errors that stood out in the NICU are those relating to the use of incorrect techniques of administration and time of mistakes.

Table2. Distribution of errors in the administration of intravenous drugs in the two NICU studied. Cuiaba-MT, 2012.

TYPES OF ERRORS *	NICU 1 (n=50)		NICU 2 (n=50)		TOTAL (n=100)	
	N	%	N	%	N	%
Errors due to use of incorrect administration techniques	43	86,0	08	16,0	51	51,0
Errors due to incorrect time	05	10,0	11	22,0	16	16,0
Errors in the administration of a medicine non authorized	01	2,0	00	0,0%	01	1,0

*May have been observed more than one error in every dose of medicine analyzed.
Source: The authors.

It is known that there are several factors that can cause errors when administering the drug[7,11]. In the present study, the non hand washing and not limitation of the conference at the time of drug administration represented 80,4% (41) 94,1% and (48) respectively of the total drug administration errors. It is emphasized that a single dose may submit more than one error. With respect to contamination of materials and/or medications, such error was observed, as well as incorrect puncture, since no newborn was punctured observed during administration of the doses.

A research developed in the NICU of a philanthropic hospital in São Paulo accredited by

the Joint Commission on Accreditation of Health Care Organization - JCAHO, drug administration errors achieved rates of 7,4%[17]. On the other hand, a research carried out in an adult ICU of a hospital in Porto Alegre, RS, professionals reported a rate of 27,3% of drug administration-related errors[18].

Medication administration errors directly affect the patient and cannot be barred by another professional in the medication system chain than their own nursing staff, who usually performs the procedure. Therefore, it is essential that the team is well trained and oriented on the administration of drugs that mistakes are not made and the drug reaches the safest way to the patient.

Bearing in mind these issues, the rate of administration errors detected in this study is worrisome, being necessary to review where professionals are making the mistake, and how the process is structured to enable this to happen. In this regard, we note that medication errors both in UTIN1 as in UTIN2 occurred mainly due to not washing hands before administering the drug and not the conference dose to be administered with the prescription. In this context, the health institutions are paramount to develop practices to motivate their employees to perform handwashing, while the Hospital Infection Control Commission (CCIH) of each institution to develop measures to encourage this habit[19].

The non-conference prescription at the time of drug administration is also a serious error, as this can be effectively the last barrier to medication error detection. Check what will be administered to avoid prescription errors that may reach the patient and cause some damage to it[13]. Making this measurement protocol at the time of drug administration, and raise awareness among professionals of their importance are fundamental to a safe medication system.

Regarding the schedule, the data showed that 16% of the time the drug was administered over half an hour late or early. Systematic review that analyzed 91 original studies on medication errors in health care settings, showed that the time of error was between three administration errors subcategory frequently intravenous medications[4].

In relation to the correct time of drug administration, it is known that it is important to closely monitor the time intervals between doses, because it is directly related to the pharmacokinetics and pharmacodynamics of the drug, and delay or anticipation of injury can lead to therapeutic not following up the action of the drug, especially in the case of antibiotics, so widely used in NICU environments[20].

One factor that influences the delay or advance in drug administration is the issue of standard time, routine found in the NICU participants. Often a large amount of drugs is deferred until the same time, making it difficult to prepare and hinders the service routine. Such issues need to be constantly evaluated and revised so that you can have a safer medication system.

CONCLUSION

By analyzing the process of administering medication through observation, one can reach the percentage of significant errors in more than half of the administered doses suffered some kind of error, what makes evident that something needs to be done for patient safety and improvement in drug delivery conditions.

Many of the errors that occurred in this process were basic, such as not washing hands, non-conference of the drug to the patient, non-prescription consultation in medical records, among others. The factors causing these errors demonstrate how simple it would be to decrease these rates, given that measures depend only on the professional action without financial cost, if carried out properly prevent such errors. Fortunately, all faults found are amenable to correction, but for this to happen there is need for greater investment in training of health professionals on patient safety and the incorporation of a safety culture by institutions.

RESUMO

A terapia medicamentosa é responsável pela maioria dos erros ocorridos durante a assistência à saúde, sendo que os erros de medicação são os mais frequentes e mais graves. O presente estudo identificou o tipo e a frequência de erros na administração de medicamentos intravenosos em duas Unidades de Terapia Intensiva Neonatais. Pesquisa transversal de natureza observacional realizada por meio de observação sistemática direta do processo de administração de medicamentos. A coleta ocorreu no segundo semestre de 2012 a partir da observação de 100 doses de medicamentos intravenosos. Os erros de administração de medicamentos se

mostraram frequentes, sendo que os mais observados foram os de técnica incorreta de administração (51%) e erro de horário (16%). Conclui-se que há necessidade da incorporação de uma cultura de segurança por parte das instituições e dos profissionais de saúde que nelas atuam para diminuição dos índices de erros e garantia de segurança dos pacientes.

Palavras-chave: Erros de Medicação; Recém-Nascido; Segurança do Paciente; Cuidados de Enfermagem.

ERRORES DE ADMINISTRACIÓN DE MEDICACIÓN EN UNIDADES DE CUIDADOS INTENSIVOS NEONATALES

Resumen: La terapia farmacológica es responsable por la mayoría de los errores que se produjeron durante la atención a la salud, siendo los errores de medicación los más frecuentes y graves. El presente estudio identificó el tipo y la frecuencia de errores en la administración de medicamentos intravenosos en dos Unidades de Cuidados Intensivos Neonatales. Investigación transversal de naturaleza observacional llevada a cabo mediante la observación sistemática directa del proceso de administración de medicamentos. La recolección se produjo en el segundo semestre de 2012 a partir de la observación de 100 dosis de medicamentos intravenosos. Los errores de administración de medicación eran frecuentes, y los más observados fueron los de la técnica incorrecta de la administración (51%) y el error de horario (16%). Se concluye que hay la necesidad de la incorporación de una cultura de seguridad por parte de las instituciones y de los profesionales de salud para disminuir la incidencia de errores y garantizar la seguridad de los pacientes

Descriptores: Errores de Medicación; Recién Nacido; Seguridad del Paciente; Atención de Enfermería.

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