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Drug preparation performed by a medication team: a descriptive study

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ABSTRACT

The medication team is a work group formed by nurses who dedicate themselves to the stages of the medication system, with certain uniformity in the accomplishment of the activities; however, no standardization of their work process was developed. **Aim**: describe the preparation of enteral medications and parenteral solutions by the medication team in the neonatal unit. **Method**: this is a qualitative, descriptive study that uses the action research method. The subjects were the nurses of the medication team of the neonatal unit. Data collection consisted of: document search; observation of medication preparation; and collection of problems at the medication team meeting. **Results**: updating of the theme and attributions of the nursing team of the neonatal unit; construction of flowcharts related to the preparation of medicines. **Conclusion**: the study allowed implementing interventions in the preparation of medicines carried out by the study subjects, standardizing the steps and defining the work relationships of the nursing team.

Descriptors: Patient Safety; Intensive Care, Neonatal; Medication Systems; Pharmaceutical Preparations.

INTRODUCTION

The medication team is a work group formed by nurses of the neonatal unit (NICU) who dedicate themselves to steps of the medication system, from the elaboration of protocols and routines to the preparation of medicines. It was created with a focus on the mitigation of medication errors and with a view to the implantation of a new work process related to the drug therapy in the neonatal unit.

The Medication Team has objectives that guide its work; they are: to promote revisions, updates, discussions and evaluation of the protocols; to be a reference, to elaborate and to implement, in a uniform way, protocols related to the preparation of medicines in the sector; to monitor adverse events caused by medication administration; to respond to technical opinions related to drug therapy, among others[1].

Considering the reality of the unit, the technology, and the inputs and equipment available, the medication team acts as a kind of "judge" based on good practices and literature, judging and making decisions related to the entire drug therapy process. The group's clinical practice is mandatory, always based on current legislation.

The Center for Disease Control (CDC) and Prevention, in its Catheter prevention guideline, advocates that the specialized IV therapy teams are effective in reducing the incidence of catheter-related infections and the incidence of complications and costs associated. In addition, it also reports that the risk of infection increases with the reduction of skilled nursing staff[2].

Patient safety is a constant concern and drug-related adverse events are more severe and more frequent when it comes to very low birth weight (NB) and lower gestational age infants admitted to a NICU. Specialized protocols and specialized teamwork should prevent human error. Part of the errors are related to complex processes, service fragmentation, and lack of standardization[3].

The nurses who make up the medication team act exclusively in the preparation of medication. They do not provide direct assistance to newborns; they are specialized in the preparation of medications and in the formulation of routines related to the medication system. However, even with a team specialized in the preparation of medications and some standard operating procedures (SOPs) related to the topic, the preparation of medications was not fully standardized and it was necessary to broaden the discussion to improve this process and review the medication system in the with a view to reducing drug-related errors.

It is important to build protocols for the preparation of drugs established by the unit itself, focused on each institutional reality, since a pre-established routine may not achieve satisfactory results[4].

The objective of the study was to describe the preparation of enteral medications and parenteral solutions by the medication team in the neonatal unit.

METHODS

It was a qualitative research that used descriptive data and the methodological strategy of action research, a method used to transform and improve the practice by the participants themselves and researchers, with effective participation of the investigated group. Priority problems are identified as the object of the investigation and actions are necessary to correct them in the form of concrete actions[5].

The study scenario chosen was the neonatal unit of a state hospital of the public network, located in the city of Rio de Janeiro, because it is the unit where the investigated medication team

is inserted. The study subjects were previously delimited by nurses who compose the medication team of the neonatal unit.

The study was sent to the Ethics and Research Committee of the institution, where it fulfilled all the requirements requested by the institution, following the precepts established in resolution 466/2012. Adopted with Opinion No 146.409.

An initial survey of the problems was carried out (exploratory phase) and it showed a lack of standardization related to the preparation of enteral drugs and parenteral solutions (research theme). In addition, it was identified the need to standardize and describe the work process of the medication team in relation to drug preparation (problem placement).

For this, it was necessary to have groups performed with the researchers and the participants of the medication team (seminars). During these meetings the topic of the research was defined and problems related to medication preparation were discussed, seeking solutions and defining guidelines for the standardization of this stage of the work process.

Therefore, updates of the investigated group were necessary by means of: theoretical classes on the subject, request for opinions and theoretical and technical support of other professionals specialized in subjects of interest (Hospital Infection Control Committee -HICC, Blood Bank, Pharmacy and Warehouse); elaboration of routines and SOPs related to the theme.

To carry out the seminars the meetings of the medication team that already happened regularly in the unit were used. All the meetings were attended by a researcher.

The seminar produces material of theoretical nature (concepts, didactic material, among others) and another of an empirical nature (surveys, discussion of problems, analysis of the situation, etc.). In addition to these, there may be another part elaborated by external or internal collaborators, which is the didactic or informative material destined to the investigated group, based on the problems found[5].

Data collection was performed between January and February 2014, according to the following steps: The first stage of the collection was constituted by the documentary research, made from the search of documents produced by the medication team in the period from August to December of 2013. SOPs, routines, communication books of the medication team and the nursing team were researched.

The second stage was composed of field research, using a systematic observation script that was part of the team work process in the preparation of enteral drugs and parenteral solutions.

The third stage was accomplished through the participation of the researcher during the meetings of the team, where the group provided data and elaborated strategies for the preparation of medicines (action plan). All contributed to the construction of effective actions for the problem. These data were recorded in minutes that were saved with the researchers for analysis.

Medication team meetings were also used to update knowledge regarding medication preparation (learning) and for feedback and appreciation by the participants of the proposals built (evaluation and outreach).

The group was updated on the topic "Drug Preparation", in addition to updating the drug dilution table.

In these group meetings, it was also identified that there was no definition of the nursing professionals who work in the unit. To this end, it was necessary to discuss with the group the definition of the nursing subcategories of the unit (leading nurse, medication nurse, nurse practitioner and nursing technician), in order to delimit the nurse team's role regarding medica-

tion and its relationship with other members of the nursing team within the medication system.

The action plan began with the rescue of the data, then the group determined actions to improve the preparation of enteral drugs and parenteral solutions, with the construction of flowcharts.

The flowcharts represented an operational sequence of all steps in the process, describing the interaction between the health professionals participating in the medication system, how they interact with each other and with the medication team nurses, defining the role of each one within the medication preparation phase performed by the medication team. It was possible to identify failures and inadequacies, with the proposition of measures that could improve the work process of the group.

Thus, the flowcharts were built with insertion or modifications of some actions suggested by the group to correct possible distortions not foreseen in the SOPs and in agreement with the literature and current legislation.

The flowcharts were presented, evaluated and approved by the nurses of the medication team who were divided into six groups, that is, one per work shift.

RESULTS

At the neonatal unit surveyed, the nursing team is composed of nurses and nursing technicians. All team members go through the work process of the medication team and have their role within the medication system.

Based on the conceptualization of all the nursing professionals who pass through the work process of the medication team, three flowcharts of drug preparation were elaborated:

At this stage, according to the SOP of the unit, it is recommended the simple washing of the hands, with water and common soap, to the forearm, for the two nurses of the medication.

Countertops, vats and trays are disinfected with non-sterile gauze soaked in 70% alcohol three times, as follows: the professional changes the gauze and expects the natural drying between each one. Unidirectional movements are performed during disinfection.

The medication preparation room is used exclusively for this purpose. It has cabinets, dry countertop, own lighting and central cooling of the institution; it presents a small opening in the door, in case of need of communication with nurses of the medication during the preparation of medicines. The conference room items are: refrigerator thermometer and environment, psychotropic and necessary material resources. If any material is missing, they are replenished before the drug preparation activity.

Labels are separated into groups by enteral medicine name before preparation.

Material resources and medicines are collected on the previously cleaned countertop. 70% alcohols, syringes, needles, gauze, procedure gloves and a previously cleaned tray are selected.

The map and the medication labels, made from the medical prescription of the previous day, are made.

Scrubbing and gowning for the preparation of enteral drugs includes a lab coat, cap, hair, and mask.

In the research unit the partitioning or maceration/grinding of tablets for the prescribed dose aspiration is not performed. In this way, the medicines available in the institution, only in the presentation of tablets, are sent to the Pharmacy Service for handling and transformation in the form of solution.

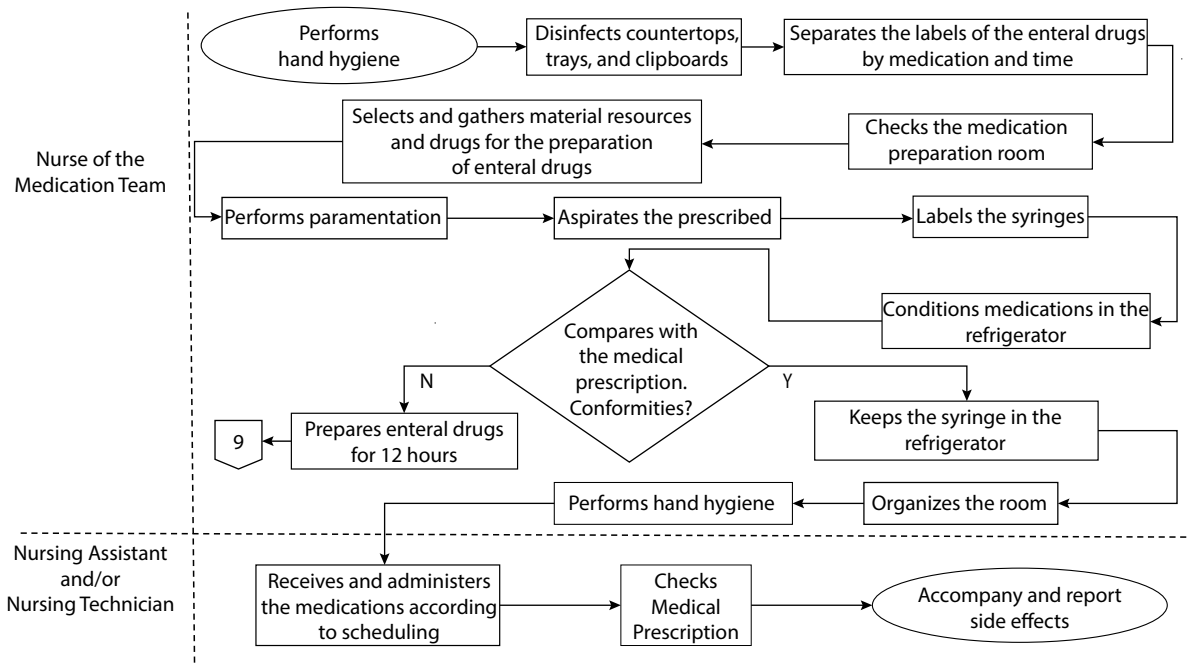
The aspirated dose is generally protected with the needle that was used for dose aspira-

Table 1. Assignments Board of the Nursing Team of the of the Neonatal Unit, University Hospital Pedro Ernesto, RJ, 2014.

Function	Assignment
Nurse Leader	Nurse responsible for the care of each shift of twelve hours, whether it is day or night service. He/she leads the entire team of nurses and nursing technicians on his/her shift; he/she assumes administrative functions and the supervision of nursing care.
Medication Team Nurse or Medication Nurse	Nurse responsible for the preparation of medicines throughout his/her work shift; He/she works in the medication preparation room; is part of the medication team; collaborates with the management and routine in the activities that aim at the organization and administration of the service, and which are related to the medication system. It is divided into:
	First nurse of the medication team - nurse responsible for the actual preparation of parenteral solutions. He/she enters the sterile field and performs complete paramentation. Together with the second nurse, he / she prepares the
	Second nurse on the medication team - a nurse who advises the first nurse of the medication team to prepare the parenteral solutions. He/she does not enter into the sterile field and does not use full paramentation. He/she manufactures medication tag labels and conducts medical prescription conferences. He/she is responsible jointly with the first nurse for the preparation of enteral drug.
Care Nurse	Nurse who answers for a sector of the neonatal unit. He/she provides comprehensive care and direct care to at-risk neonates and supervises the nursing technicians team in the sector.
Nursing Technician	Nursing technician who provides comprehensive care to newborns of lower complexity, according to the scale of tasks elaborated by the leading nurse. He/she is supervised directly by the support nurse and indirectly by the nurse leader of the work shift.

Source: authors

Figure 1. Flowchart of Preparation of Enteral Medications by the Neonatal Unit Medication Team. RJ, 2014.



Source: authors.

tion. The syringes are labeled with medication labels and placed temporarily in vats located next to the drug preparation area until the completion of all enteral medications on the 12-hour shift when they are transferred to plastic boxes and placed in the refrigerator. The boxes are identified and divided by time, to facilitate the distribution of the drugs of that time set for administration.

After the medical prescription of the day, which is valid for 24 hours, the nurse of the medication team checks the enteral prescription drugs with their medication map. If the enteral drug is discontinued, it is disregarded. If it is changed, the map and labels are changed and the medicine is re-prepared.

With the observation that there is little variation in the medical prescription of enteral medication and doses and based on the premise that drug therapy cannot be discontinued, enteral drugs are prepared for 12-hour shifts.

Enteral medications are withdrawn from the refrigerator approximately half an hour before the time they will be administered and distributed in vats individualized per newborn.

The nurses of the medication team organize the vats, trays and other materials used in the preparation of enteral medications and carry out the hygiene of the hands.

Enteral drugs in the neonatal unit can be administered by both the nurse and the nursing technician who is in the care, performing the double check with the appropriate recommendations of the nurse of the medication. Before administering the medication, the provider must confirm the identification of the newborn, the correct name of the medication, route of administration, schedule and dose of the medicine.

After administering the medication, the nurse or nursing technician checks the medical prescription. In case the prescription has not yet been prepared, it will only be checked after its preparation. In addition, the volume administered is recorded on the balance sheet.

For the second nurse, only the hygiene of the hands is recommended. Surgical antisepsis of the hands or "degermation of the hands" is not necessary, as surgical antisepsis is known in the neonatal unit.

The countertop is disinfected again and the labels are separated by time, according to the medical prescription.

At this stage, a nominal list of newborns hospitalized in the unit using psychotropic drugs and special medications occurs. Specific forms are prepared for each type of medicine.

The leading nurse checks the internal control forms for psychotropic or special medication, in addition to the medical prescription, and sends all the documentation to the Pharmacy Service.

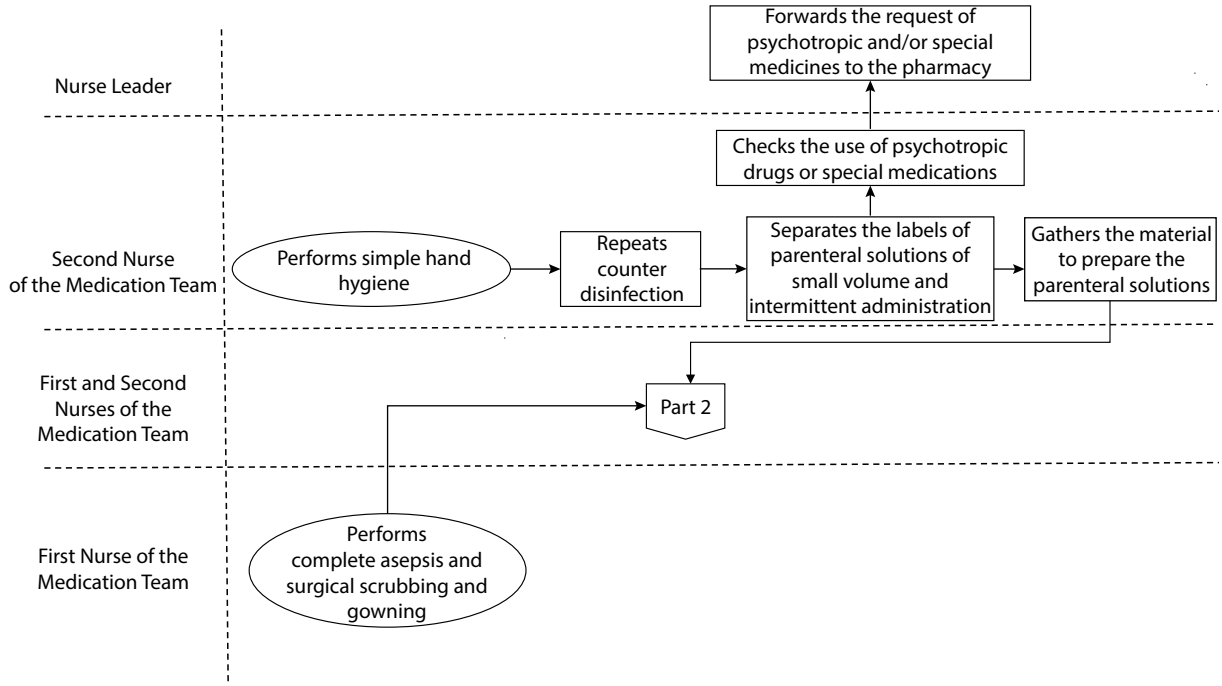
The second nurse selects all sterile and supportive materials from the pharmacy and warehouse needed to prepare the parenteral solutions.

While the second nurse on the medication team organizes the preliminary process of preparing the parenteral solution, the first nurse also performs some preliminary activities, such as wearing a cap and mask and performing the full degermation. After the degermation, he wears the sterile cloak, with the aid of the second nurse and wears sterile gloves for the preparation of the parenteral solutions.

After the first stage of the Preparation of Parental Solutions by the Medication Team, they proceed to the second stage.

Similar to the preparation of enteral medications, the second nurse in the medication team checks the medication map and the label of small volume parenteral solution and intermittent administration with the current prescription, which may be the medical prescription of the previous day, if the new medical prescription

Figure 2. Flowchart of Preparation of Parental Solutions by the Neonatal Unit Medication Team. RJ, 2014 (part 1).



Source: authors.

has not been made.

After making the medical prescription of the day, the nurse on the medication team performs this whole conference process again.

If the small volume parenteral solution and intermittent administration is included, suspended or altered, the medication map and the medication labels are changed according to the current medical prescription.

If there is no change in the medical prescription regarding the type and dose of the small volume parenteral solution and intermittent administration, the medication map and the medication labels are maintained and the preparation proceeds at the time of medical prescription.

According to the routine of the unit, the preparation of parenteral solutions occurs moments before the solutions are administered.

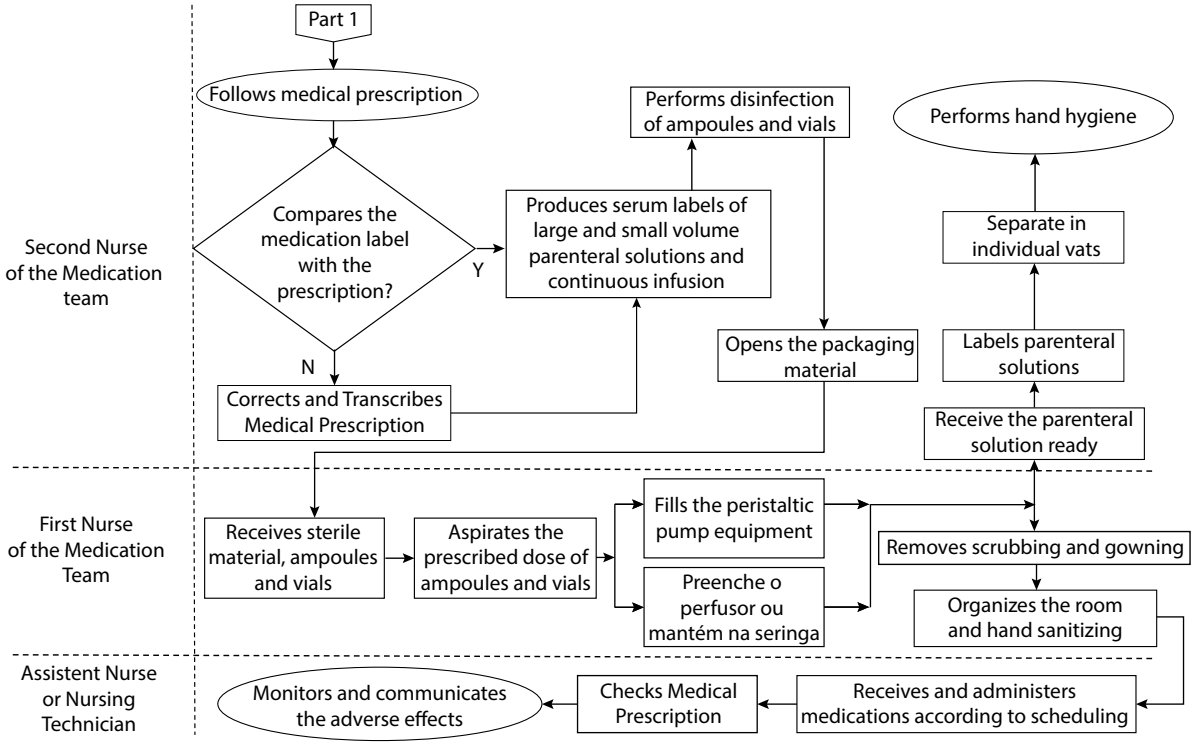
After checking the new medical prescription, labels are made, standardized by the institution, for parenteral solutions of continuous infusion, whether small or large volume.

In addition, the expiration date of the continuous infusion set, used in closed systems and peristaltic pumps, which is established every 96 hours by the HICC, is verified. If it is the exchange date, this information is recorded on the medication map. Valves and extenders that accompany the infusion system are exchanged together with the equipment.

Total Parenteral Nutrition (TPN) equipment, extenders of intermittent parenteral solutions and continuous infusion (open system) small volume parenteral solutions are exchanged at each stage.

The serum label prepared for large and small volume and continuous infusion parenteral solutions contains the following information: Name, clinic, bed, start time, end time, number of drops per minute, total volume, serum, medications, dosages and nurse's signature.

Figure 3. Flowchart of Preparation of Parental Solutions by the Neonatal Unit Medication Team. RJ, 2014 (part 2).



Source: authors.

Disinfection of ampoules and vials is performed with gauze soaked in 70% alcohol 3 times, changing the gauze and waiting for natural drying between each. Unidirectional movements are performed during disinfection, as recommended by the HICC of the institution.

After this step, the second nurse opens the sterile area and the packages of the material previously collected and delivers them to the first nurse of the medication, who is waiting and is properly scrubbed and gowned.

The first nurse receives all the material from the second nurse aseptically, so that it does not contaminate the sterile field. For this, the material is passed from the second nurse's hand to the hand of the first nurse, so that the package is with the second nurse and the sterile material contained in the package is facing the first nurse.

The solutions contained in ampoules and vials are made available to the first nurse on the medication team so that they do not come in contact with it. They are opened by the second nurse and are inspected for validity and integrity, directed towards the first nurse who aspires the solutions, without any contact with ampoules and vials.

The Drug Dilution Table for the industry is consulted at this stage (Drug Name, Storage Conditions, Dilution Solutions, Compatible Solutions, Drug Infusion Time, Stability After Reconstitution, and Observations).

If this is a parenteral solution of small volume of bolus administration, during preparation the syringe remains attached to the needle, used as a syringe protector. The small volume parenteral solution that has a predetermined infusion time (rapid, slow, and continuous) is coupled to a syringe pump.

In the case of large-volume parenteral solutions and continuous infusion, the medicine is aspirated from vials and ampoules, and coupled into dated systems of closed peristaltic pump systems with expiration dates.

After receiving the parenteral solution, the second nurse checks the dose and labels the medication-labeled syringes (small volume parenteral solutions and intermittent administration) or serum label (parenteral solutions of either large or small volume and continuous infusion) previously made.

After identifying the parenteral solutions, the second nurse performs hand hygiene.

After the delivery of the parenteral solutions to the second nurse, the first nurse removes cap and mask, cape and gloves, in this order, folds the cloak with the inner part facing itself and the sterile part inside, in order to keep it clean.

The first nurse organizes vats, trays and other materials used in the preparation of parenteral solutions, and then he performs hand sanitizing.

The administration and check-up phases are similar to those described in the enteral drug preparation flow chart, except for the category administering parenteral solutions. Medications or parenteral solutions in central venous catheters are administered only by nurses and peripheral venous accesses by nurses or nursing technicians.

After the administration of the drug, the care nurse or nurse technician monitors the patient for possible effects of the medication. If these occur, it communicates to the medication nurse and the nurse leader any adverse events in relation to the medicine administered. And then he records it in the medical record.

DISCUSSION

The preparation area for parenteral solutions should be unique for this purpose, due to the complexity and risks. Access to the preparation environment for parenteral solutions should be restricted to professionals directly involved in this practice[6].

The medication preparation site should be an environment aimed at avoiding interruptions during the preparation of the drug. People circulation in the room should be prevented, as well as the temperature in the room should be checked and controlled[4].

Simple hand washing can be performed prior to preparation and manipulation of medications; however, the use of alcoholic preparation (antiseptic rubbing) is recommended as a preferred means for hand hygiene prior to drug manipulation[7].

However, it has been observed that performing simple hand washing is still a frequent practice before drug preparation. Thus, this practice has been replaced by alcoholic friction, as the literature recommends.

With regard to personal protective equipment, these should be used in accordance with the institutional protocols[4]. The institution's HICC is responsible for standardizing personal protective equipment and procedures in order to ensure safety to professionals and patients.

Items that can be disinfected with alcohol are surfaces of furniture, countertops and equipment such as ampoules and glass. The applications should be applied through friction with 70% alcohol, for three consecutive times, waiting for the alcohol to dry at each friction[8]. In this sense, it is recommended that the countertop be cleaned and disinfected before the preparation of drugs, with alcohol at 70%[2].

Protection of the syringe with needles for enteral medications may lead to medication

errors related to the wrong route of administration, as well as to cause accidents with sharps.

The tablet partitioning is mainly performed for children and the elderly, who are populations most vulnerable to the negative clinical consequences of this practice, caused by the possibility of imprecision in the dosage, especially in the tablets that do not have furrows indicative of partition[9].

The organization of the medicines in trays, when there are medicines of several patients, can increase the chances of patient exchange[10].

For the preparation of parenteral solutions it is necessary to use techniques and measures that ensure its microbiological integrity and its physical-chemical balance[6]. Therefore it is important to carry out measures related to the prevention of contamination of solutions and bloodstream infections, establishing standardized protocols in the sector, validated according to reality and clients served, always taking into account the legislation, current literature and protocols established by the HICC.

The disinfection of the countertop during the preparation of oral medication does not exempt the repetition of this procedure when preparing the parenteral solutions in order to avoid contamination of the preparation of enteral medicinal products.

The timing of drug preparation should be considered with regard to the post-reconstitution/dilution stability period, as this may be altered when the practitioner prepares the drug well in advance of the time at which the drug will be administered or prepared without observing dilution protocols[11].

Parenteral solution kits, secondary assemblies, and additional devices used to connect the equipment must be exchanged for at least 96 hours for up to 7 days. Parenteral solutions are valid for 24 hours in closed infusion systems[2].

The equipment used in the administration of lipid emulsions, TPN and parenteral solutions of intermittent infusion should be changed every 24 hours[2].

However, current legislation recommends that labels should be correctly identified with patient name, bed/record, product name, qualitative and quantitative description of the additive components in the solution, volume, infusion rate, route of administration, date and time of preparation, and identification of who prepared it[6].

Thus, data such as the date and time of preparation, NB recording, infusion rate and route of administration were not recommended on the standardized label in the neonatal unit. The recording of these data on the serum label depended on the availability of each medication nurse to register them throughout each work shift, leading to frequently forget, mainly, the date and the registry of the NB. The route of administration was rarely recorded, since these serum labels are only used for administration of parenteral solutions. In view of the above, the group decided to reformulate the serum label with the addition of information that contemplates the current legislation.

Friction of the neck of ampoules and vials of parenteral solutions should be performed with alcohol 3 times, drying naturally before use[4,12]. In addition, the recommendations of the HICC regarding the disinfection of vials and ampoules in the preparation of parenteral solutions should be followed[6].

Before preparation of parenteral solutions it is necessary to inspect the medication in relation to its physical and chemical integrity, and disinfect the work surface and trays with the solution established by HICC[4].

Regarding scrubbing and gowning, the technique used to fold the cloak, in order to keep it clean can lead to the contamination of the

sterile field, since after its first use, the sterility of the cloak cannot be guaranteed until its next use. In addition, there are no recommendations in the literature with levels of evidence that recommend the use of a sterile cloak during the preparation of parenteral solutions.

Due to the great variability of medications, the stability time after reconstitution is differentiated; therefore, it is suggested that the preparation be carried out immediately prior to administration, in order to minimize the possibility of errors and possible decrease of the therapeutic effect[4].

Medications should be separated individually, after preparation, checking name, dosage and expiration date[4].

Double check-ups should be implemented by the nursing staff before the drug is administered. Double checking is particularly important for prescription drugs in Pediatrics and Intensive Care Units, especially at the time of administration[13].

The nursing team should follow some check items for safe drug administration: right patient; right medication; right route; right time; right dose; right documentation. It is worth mentioning a last item called Correct Orientation, which is about clarifying doubts on the reason for the indication of the medicine, its dosage or other information before administering it to the patient (in this case, family) with the prescriber[13].

Some adverse events that occur with medications may be in the very specificity of neonatal intensive care. The administration of medicines in NB requires several calculations to obtain the right dosage, strict drug intervals and narrow therapeutic margin. The complexity of the dosage influences a greater number of processes in its manipulation, such as dilutions and fractions, as well as peculiarities in the administration of the drug, such as the need for infusion pumps, so that the drugs themselves do not cause vascular damage, among others[3].

However, there was no systematization of patient monitoring of adverse events related to drug therapy in the neonatal unit, making it difficult to investigate and implement measures to prevent new events of this type, based on possible statistics related to types and causes.

In addition, the lack of frequent registration, even when it was necessary to prescribe medications to reverse the possible adverse effect, would later create difficulties to relate it to the event occurred.

Any adverse events occurring related to infusion therapy should be properly investigated based on records of the problem. Due to the suspicion and the result of the investigation, actions should be implemented to correct the possibility of a new occurrence of the event[6].

At the last meeting of the medication team, the group decided to make an adverse event reporting form that contemplates possible unwanted effects with medications.

CONCLUSION

In this study, it was possible to recognize the work process of the medication team related to drug preparation (research), revealing its steps and nuances, in order to plan and implement interventions (action) in this process.

Several parts of the drug preparation were already structured; however, it was necessary to group them, creating links between them and characterizing a system of work.

One aspect to be observed is the fact that the changes in the work process of the group were initiated during the study, generating an immediate impact on the medication team's performance, from the updating of the medication preparation and the nursing attributions of the

neonatal unit, which allowed to conceptualize the relations between the nursing team and the other professionals who work in this work process.

In addition, they potentiated pertinent solutions to the problems of the team, all generated by the subjects who demonstrated to have knowledge of the problems related to their daily life, making it rich and objective.

REFERENCES

1. Almeida VS, Andrade M, Silva GRG. Monteiro JLS. Silva GD.Querido DL. The work process of a medication team at the neonatal intensive care unit. J Nurs UFPE on line. [Internet]. 2013 February 16 [Cited 2016 Nov 11]; 7(5). Available from:http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/4470
2. Center for Disease Control and Prevention. Guidelines for the prevention of intravascular catheter-related infections. [Internet]. 2011 [Cited 2016 Oct 24]. Available from: http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf.
3. Lanzillotti LS, Seta MH, Andrade CLT, Junior WVM. Adverse events and other incidents in neonatal intensive care units. Ciênc. saúde coletiva. 2015 [Cited 2016 Nov 11]; 20(3):937-946. Available from: https://www.researchgate.net/profile/Walter_Mendes/publication/273380755_Eventos_adversos_e_outros_incidentes_na_unidade_de_terapia_intensiva_neonatal/links/55c1075408ae9289a09cfe69.pdf
4. Camerini F, Colcher A, Moraes D, Souza D, Vasconcelos J, Neves R. Risk Factors for the occurrence of errors in the preparation of intavenous medications: an integrative review. Cogitare Enferm. [Internet]. 2014 [Cited 2016 Nov 11]; 19(2). Available from: doi:http://dx.doi.org/10.5380/ce.v19i2.37362
5. THIOLLENT, M. Metodologia da pesquisa-ação. São Paulo: Cortez; 2011.
6. Brasil. Resolução RDC 45 de 12 de março de 2003. Dispõe sobre o regulamento técnico de boas práticas de utilização das soluções parenterais e serviços de saúde. Diário Oficial [da] República Federativa do Brasil. Brasília; 2003.
7. Brasil. Protocolo de higienização das mãos em serviços de saúde. Brasília: Anvisa; 2013.
8. Brasil. Manual de Segurança do Paciente em Serviços de Saúde: limpeza e desinfecção de Superfícies. Brasília: Ministério da Saúde; 2010.
9. Teixeira MT, Sá-Barreto LCL, Silva DLM, Cunha-Filho MSS. Panorama dos aspectos regulatórios que norteiam a partição de comprimidos. Rev Panam Salud Publica. [Internet]. 2016 [Cited 2018 Apr 17]; 39(6):372–77. Available from: https://scielosp.org/pdf/rpsp/v39n6/1020-4989-RPSP-39-06-372.pdf
10. Souza S, Rocha PK, Cabral PFA, Kusahara DM. Use of safety strategies to identify children for drug administration. Acta Paul Enferm. [Internet]. 2014 [Cited 2016 Nov 11]; 27(1):6-11. Available from: http://www2.unifesp.br/acta/pdf/v27/n1/v27n1a6.pdf
11. Giron, CF, Dopico LS. Patient safety: analysing intravenous medication preparation in a sentinel network hospital in brazil. Texto Contexto Enferm. [Internet]. 2011 Mar [cited 2016 Nov 11]; 20(1): 41-49. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-07072011000100005&lng=en. http://dx.doi.org/10.1590/S0104-07072011000100005.
12. Rigotti M, Ferreira A, Andrade D, Watanabe E. Disinfection of ampules for intravenous administration: an integrative review. J Nurs UFPE on line. [Internet]. 2013 [Cited 2016 nov 9]; 7(7). Available from: http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/2830
13. Brasil. Ministério da Saúde. Portaria n. 2.095, de 24 de setembro de 2013. Protocolos básicos de segurança do paciente: prevenção de quedas, identificação do paciente e segurança na prescrição, uso e administração de medicamentos [Internet]. Brasília; 2013 [citado 2018 Apr 18]. Disponível em: http://portalarquivos.saude.gov.br/images/pdf/2014/julho/03/Protocolo-Medicamentos.pdf

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