Safe patient care in the preparation and administration of medicines

Assistência segura ao paciente no preparo e administração de medicamentos

Atención segura al paciente en el preparado y administración de medicamentos

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ABSTRACT

Objective: To evaluate the compliance with the assistance and the adhesion of nursing professionals for the safe administration of drugs in an Intensive Care Unit of a public hospital in Sergipe, Brazil.

Method: Quantitative, descriptive and cross-sectional study carried out by direct non-participant observation. Data collection performed in 2015. Non-probabilistic sample, for convenience, consisting in the observation of 557 doses of prepared and administered drugs. For data analysis, descriptive statistics were used for data analysis.

Results: The items classified as safe care were: correct via (85.7%) and correct form (100%). The items classified as undesirable care were: correct patient (33.3%), correct medication (66.67%), correct dose (50%), correct register (33.33%), correct orientation (0%), and correct time (50%).

Conclusion: The practice was evaluated according to Carte's positivity index as undesirable care, considering that six of the eight items had low adhesion. The found weaknesses compromised the whole process of drug administration.

Keywords: Patient safety. Nursing care. Medication errors.

RESUMO

Objetivo: Avaliar a conformidade da assistência e a adesão dos profissionais de enfermagem para a administração segura de medicamentos em uma Unidade de Terapia Intensiva de um hospital público de Sergipe, Brasil.

Método: Estudo quantitativo, descritivo e de corte transversal realizado por meio de observação direta não participante. Coleta realizada em 2015. Amostra não probabilística, por conveniência, constituída da observação de 557 doses de medicamentos preparados e administrados. Para análise dos dados, foi utilizada estatística descritiva.

Resultados: Foram classificados como assistência segura os itens via certa (85,7%) e forma certa (100%) e como assistência sofrível os itens paciente certo (33,3%), medicamento certo (66,67%), dose certa (50%), registro certo (33,33%), orientação certa (0%) e hora certa (50%).

Conclusão: A prática avaliada foi classificada segundo o índice de positividade de Carter como assistência sofrível, considerando que seis dos oito itens avaliados alcançaram baixa adesão. As fragilidades encontradas comprometem todo o processo de administração de medicamentos.

Palavras-chave: Segurança do paciente. Cuidados de enfermagem. Erros de medicação.

RESUMEN

Objetivo: Evaluar la conformidad de la asistencia y la adhesión de los profesionales de enfermería para la administración segura de medicamentos en Unidad de Cuidados Intensivos de un hospital público de Sergipe, Brasil.

Método: Estudio cuantitativo, descriptivo y de corte transversal realizado por observación directa no participante. La recolección de datos fue realizada en 2015. Muestreo no probabilística, por conveniencia, compuesto por observación de 557 dosis de medicamentos preparados y administrados. Para el análisis de los datos, fue utilizada estadística descriptiva.

Resultados: Fueron clasificados como asistencia segura los artículos vía correcta (85,7%) y forma correcta (100%) y como asistencia sufrible los artículos paciente correcto (33,3%), medicamento correcto (66,67%), dosis correcta (50%), registro correcto (33,33%), orientación correcta (0%) y hora correcta (50%).

Conclusión: La práctica fue evaluada de acuerdo con el índice de positividad de Carter como asistencia sufrible, considerando que seis de ocho artículos tuvieron baja adhesión. Las fragilidades encontradas comprometen todo el proceso de administración de medicamentos.

Palabras clave: Seguridad del paciente. Atención de enfermería. Errores de medicación..

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INTRODUCTION

Patient safety became relevant in health services since the publication of the "To Err is Human" report of the Institute of Medicine (IOM), becoming one of the six quality attributes for healthcare. From then on, it has been sought to implement surveillance strategies aimed at protecting individual and collective health through risk management[1].

As a stimulus to safe practice, the World Health Organization (WHO) has established a set of basic protocols, including the safe use and administration of medicines[1]. The procedure of preparation and administration of medicines as an essential care for the reintegration of health is considered a challenge when it comes to the construction of a safe practice. Errors can occur at any stage of drug therapy, causing harm to the patient[1]. Events of this nature, although avoidable, may be frequent in Intensive Care Units (ICUs), especially for presenting patients with high criticality.

Medication errors negatively affect care, generating unnecessary costs for health services, prolonging the length of hospital stay and actions with litigation issues[1], which leads to a disproportion in the performance of the professionals and health institutions involved.

Medication errors have been observed in several countries of the world. Rates in Germany and England were 4.78% and 3.22%, respectively[2]. In the Americas, rates reached up to 30.4%, with the exception of the USA, which averaged 5.64%[3].

In Brazil, high error rates were recorded (64.3%) when compared to other countries, focusing on the preparation and administration of medications[4]. A study carried out in a large hospital in the southeast region of the country, had the record of 16,753 medication errors in the period 2007-2013, with 18.9% of these occurring in the adult ICU[5].

In view of the magnitude of the problem, at the national level, the National Patient Safety Program (NPSP) was established through the Administrative Rule No. 529/2013, with a view to improving and updating care practices in Brazilian health institutions, favoring the reduction of adverse events, including the use of medications[1].

Regarding the problem of errors in the preparation and administration of medications and their negative impact on patient safety, it is evident the necessity of knowing the weaknesses involved in this process, a condition that may contribute to the implementation of prevention and control measures.

With regards to this this context, the following research question came up: What is the degree of adhesion of nursing professionals and what is the compliance of the care of an intensive care unit when evaluating the items for the safe administration of medication? In this way, the study aimed to evaluate the compliance of nursing care and the adhesion of nursing professionals to the items of verification for the safe administration of drugs in an intensive care unit of a public hospital in Sergipe, Brazil.

METHODS

This is a cross-sectional study with a quantitative approach performed at a surgical ICU of a public hospital in the state of Sergipe, Brazil. The unit has a physical capacity for 27 beds, where serious clinical and polytrauma patients are assisted, who need monitoring and continuous surveillance of a specialized team. About 110 nursing professionals provided direct assistance to these critical patients.

Because the purpose of the research was the observation of a procedure, the sample was classified as observational, of the non-probabilistic type and for convenience. Prior to this stage, at the study location, a previous survey was carried out for seven days, in order to verify the number of procedures involving the administration of medications performed by the nursing team. After this survey, the calculation of the sample determined 552 doses to be observed (events); however, 557 were observed, with a margin of error of 2%. The inclusion criteria for the selection of the event were as follows: doses of medications administered by nursing professionals who worked for at least six months in the chosen unit and as a criterion of exclusion professionals who were on vacation or on health leave.

The data collection was done through direct observation, non-participant, in the first half of 2015, from Monday to Saturday, during the three work shifts, after signing the Free and Informed Consent Term (FICT). In order to minimize bias during the data collection process, the professionals were informed that they would be observed during their daily activities, without, however, specifying practices involving the preparation and administration of medications.

It should be pointed out that as the research location did not have a specific protocol for safety in the prescription, for the use and administration of medicines, it has been adopted as the "proper time" the medication that was administered up to 30 minutes before or after the prescribed time, according to the Brazilian Nursing Network and Patient Safety[6].

Two collection instruments were elaborated, the "Questionnaire for characterization of the professionals" and the "Instrument for observation of the processes of preparation and administration of medicines". The first, self-applied, included social and professional data, age, training time, amount of labor ties, daily workload, in-

volvement with medication errors, access to institutional protocols related to prescription safety, preparation, and medication administration.

The second instrument, a checklist, was constructed based on the Safety Protocol for the prescription, use, and administration of drugs[6], composed of the observation of the procedure containing the eight items for the safe administration of drugs. It should be highlighted that in this study it was not possible to verify the "right answer" (ninth item), due to the difficulty of monitoring the effect or response of the drug after administration.

These instruments were subjected to a pilot test, carried out for five days, in a unit that is similar to that surveyed, notes that were not included in the sample. The identified fragilities were solved. It should be pointed out that all the observers received prior training.

Descriptive statistics were used for data analysis. To calculate the adhesion rate, the following formula was used[6]:

Adhesion (%) = Actions performed/Opportunities X 100

In order to assess the degree of conformity of the care practice, in terms of quality, the Positivity Index proposed by Carter was used, where: 100% adhesion represents a desirable care; 90-99% adequate care; from 80 to 89% a safe care; from 70 to 79% borderline care; and less than 70% undesired, poor or inadequate care[7].

The research complied with the guidelines of the Resolution 466/2012, being approved on October 17, 2014 by the Research Ethics Committee of the Universidade Federal de Sergipe/Brazil, with certificate of presentation for ethical appreciation at 36926514700005546.

RESULTS

In the present study, 577 (100%) doses of medications prepared and administered by nursing professionals were observed, of these 199 (34.5%) were performed in the morning shifts, 184 (31.9%) in the afternoon and 194 (33.6%) in the evening. Regarding the execution, 98.8% (570) of the practices were performed by the nursing technicians' category and 1.2% (7) by the category of nurses, consolidating the participation of 42 professionals in the target unit.

The 21.4% (9) of the participants were nurses. Of these, 88.8% (8) were female, ranging in age from 29 to 43 years old. They stated that they had 7.5 years of professional training, 55.6% (5) with two labor ties, and 88.9% (8) with a daily workload of six hours. Regarding academic specialization, 77.8% (7) of the professionals had a *latu-sensu* specialization and stated that they had an update on the preparation and administration of medicines with an interval of one year or more.

The nursing technicians accounted for 78.6% (33) of the sample, of which 81.9% (27) were female, ranging in age from 25 to 57 years old. In terms of professional training time, the professionals declared that they had 5.5 years of experience in average, 57.6% (19) had only one employment relationship, and 3% (1) more than three links. In addition, 78.8% (26) of these professionals mentioned working six hours a day. Only 3% (01) of the professionals declared to have academic specialization, of the *latu sensu* type. For the last update involving the topic of drug preparation and administration, 54.5% (18) reported having it performed with an interval of one more year.

Initially the answers of the professionals will be presented according to the questionnaire. The professionals pointed out among the possibilities of error, **the non-observation of the right nine** with 40% (4) and 60% (20), respectively, for nurses and nursing technicians.

The nurses scored as main errors the **right medicine** item with 33.3% (3), Followed by the **right dose**, with 16.7% (2). The technicians mentioned as main errors the non-observation of **time, dose and correct orientation**, being 16.7% (6) for each item.

Regarding the knowledge of the Safety Protocol in the prescription, use and administration of drugs of ANVISA, 66.7% (6) and 54.5% (18) of the nurses and technicians, respectively, said they did not know about it. Also, when questioned about accessibility to institutional protocols, 77.8% (7) of the nurses and 63.6% (21) of the nursing technicians stated that they were not available.

The results of the non-participating observation will be presented below. Regarding hand washing prior to the preparation and administration of medications, 98.8% (570) of the observations showed that professionals did not perform such a procedure, and 49.5% (104) did not label the medication to be administered.

The via of administration most observed in the prescriptions was parenteral, followed by oral or nasoenteric (SNE) and inhalation.

In order to observe the **right patient** item, the clients were classified according to the state of consciousness, in this way, 80.2% (463) presented low level of consciousness. It should be highlighted that during the observation of this item, none of the patients that did not present a lowering of the level of consciousness, 19.7% (114), were questioned about their identity through an open question.

Still in relation to the first item, it stood out the action **checked the name in the medical record** with 97.9%

(565), followed by the action **checked the identification in the bed**, 1.6% (9). The general adhesion rate for the **right patient** item was 33.3, for every one hundred-observation opportunities, and was classified according to the Positivity Index as a poor care.

In the verification of the **right medication**, most of the actions had high adherence rates, especially the **use of the prescribed medication** with 99.8% (576) and **use of the prescribed diluent**, with 99.6% (470). However, the overall adherence rate calculated for the **right medication** item was 66.7 for every 100-observation opportunities, and it was also classified as a poor care.

Regarding the **right via** (Table 1), the actions of the **check the prescribed via** and **use of the technically recommended via**, with 100% adherence (577), were highlighted. The calculation of the global membership for this item was 85.7, for each one hundred-observation opportunities, being configured as a safe assistance.

Table 1 – Adherence to the verification item "right via" during the preparation and administration of drugs in the surgical intensive care unit of Aracaju, Brazil, 2015

Actions observed for the item right via	Observed doses N (%)	Adhered N (%)	Did not adhere N (%)	Adhesion rate %
Did the professional use the prescribed via?	577 (100)	577 (100)	-	100
Did the professional use the technically recommended via?	577 (100)	577 (100)	-	100
If necessary, did the professional check the volume of the diluent?	472 (100)	470 (99.6)	2 (0.42)	99.6
Did the professional evaluate the suitability of the materials for the administration of the drug?	577 (100)	576 (99.8)	1 (0.18)	99.8
In case of patients with multi-devices, did the professional evaluate the correct connection for the administration of the drug?	464 (100)	462 (99.6)	2 (0.43)	99.8
If necessary, did the professional perform antisepsis of the patient's skin prior to the administration of the drug?	101 (100)	10 (9.9)	91 (90.1)	9.9
In case of doubts, did the professional try to solve them before administering the drug?	13 (100)	13 (100)	-	100

Source: Research Data, 2015.

Regarding the **right time** item, the only action that had specific adhesion was **the professional prepared the medication in the period that guaranteed the prescribed time** with 67.6% (317). The overall adhesion rate for this item was 50, for every 100-observation opportunities, classified as a poor care.

On the other hand, the item **right dose verification** was also classified as a poor care, with an overall adherence rate of 50 for every 100-observation opportunities. The actions **checked the prescribed dose**, 100% (577) and **checked the programming and operation of the pump**, 99.2% (132) stood out.

Regarding the **right registry** item, it was found that in 11.9% (69) of the observed cases there were occurrences during the administration process, including postponements, cancellations, lack of supply, patient refusal and adverse events after administration.

As for the actions for the item **right registry**, the action was highlighted: the professional **marked the prescribed time for administering the medication in the medical prescription sheet** with a specific adhesion rate of 72.4% (418); followed by the actions **the professional registered the medication administration time in the medical record**, 7.3% (42); and if occurrences, **the professional in the occurrence of complications recorded them in the medical record** with 2.9% (2). Also, the general adhesion rate for certain registration was 33.3, for every one hundred observation opportunities, and it was classified as poor care.

It should be observed that for the analysis of the **patient orientation item regarding the medicine to be administered, including the name and expected effects**, were considered 114 (19.8%) observations in which the patients were conscious. Still with regard to

this item, **right orientation**, little adherence rates were identified in all actions ranging from 0.88 to 2.63, for each one hundred observation opportunities, classifying care as undesirable.

Regarding the item **right form**, referring to the **pharmaceutical form consistent with the prescribed via of administration**, all the actions obtained high adherence, with values above 99.83, for every one hundred-observation opportunities. Therefore, this check item obtained a high positivity index, being classified as a desirable care.

DISCUSSION

During the observation of the care practice evaluated, professionals of the Nursing Technicians and female category prevailed. Researches carried out in critical units in the southeastern and northeastern regions of the country corroborates these data, pointing out that the majority of professionals in intensive care units belong to the category of nursing technicians with a predominance of women[8-9]. The largest number of nursing technicians in relation to nurses is justified by the sizing rules still adopted by Brazilian health institutions, sometimes mischaracterizing the real need. Regarding the predominance of the female gender, it is necessary to consider the historical and cultural aspect of nursing, formed in its entirety by women.

On the other hand, the training time was lower for the present study when compared to professionals from the state of São Paulo, with values of 9.4 and 11.6 years for nurses and nursing technicians, respectively[9].

As for the participation in upgrades, the professionals stated to have participated, at least, a year ago. In this respect, the safety protocol on the prescription, use and administration of drugs recommends that health institutions should provide their employees with permanent and in-service education, as well as annual training for the safe execution of this practice[6]. Standardized training significantly reduces the probability of errors and favors their interception before the event reaches the patient[10].

The professionals participating in this study mentioned their involvement, at some point in their practice, with medication errors, highlighting the items **medication, dose, time, and correct orientation**. On the other hand, they expressed the lack of accessibility to the institutional protocols related to these issues.

In agreement, a study carried out in a hospital in the southern region of Minas Gerais, observed that the most common errors among the nursing professionals involved the items via (6.98%), dose (11.63%) and time of the (44,19 %) administration[11].

Regarding accessibility to documents, the safety protocol on the prescription, use and administration of drugs guides that regulates this process, besides being described and updated, should mainly be disclosed among health professionals as a form of alert and awareness[6]. The use of protocols increases the effectiveness of care as well as the safety of patient care; the absence of these instruments makes it impossible to standardize the actions performed by the nursing team, increasing the risks during medication administration.

It was identified that most professionals did not adhere to the hand hygiene procedure during the handling and administration of the medications, as well as a significant percentage did not label the medication to be administered. Non-adherence to hand washing in the preparation and administration of medications was also observed in 50% of practices in a study conducted in the region of Minas Gerais (48.79% of occurrences)[11], these data demonstrate that despite being a simple and effective measure, it is not yet effectively inserted as part of the safety culture in Brazilian health institutions.

The non-labeling of the prepared medications is mentioned as a factor of extreme concern, since the failure or absence of identifications favors the occurrence of errors[12]. This fact may be due to the overload of work in intensive care units because of an inadequate quantity of employees, which can generate physical and/or mental fatigue and wear and tear, with consequent risk to the health of patients who, by their nature, demand extreme care.

When analyzing the eight items of verification, the professionals presented greater adhesion to the item **form and right via**, classified as safe care in this research. On the other hand, a national study showed that the via of administration had low compliance rates, accounting for 64.7% of adverse events[13]. Also, it should be noted that the high rate of adhesion to the item **right via** in the present study, can be considered as positive, since it guarantees the safety in the drug therapy performed by the professionals working in the research unit.

Regarding the item **right form**, it is believed that the high adhesion rate for this item is due to the type of dispensation adopted by the satellite pharmacies in the unit, which use the unit dose distribution system (per patient), recommended standardization by the Ministry of Health, in order to minimize the number of adverse events[6].

The other items of verification, **medication, time, dose, patient, registry** and **correct orientation** were classified as poor or undesirable care.

The errors involving the administration of drugs are associated with the non-conferring of the drug and agglome-

ration of several types in a single tray, which contributes to the exchange of the medication at the time of application[14].

This item reinforces the importance of proper labeling and identification of medications favoring patient safety policy and culture. The overload of work or the inadequate design of the nursing professionals interfere in the quality of the executed processes. Thus, in the expectation of performing all daily activities, the safe practices are excluded from the routine, such as the use of gloves, the identification of the medications, the disinfection of ampoules, in an attempt to perform all the activities that have been delegated.

In a study carried out in the southern region of Brazil, the most prevalent type of error was the substitution error, that is, the administration of another drug other than the prescribed one, corresponding to 68.4% of the total errors identified[15].

The low rate of adhesion to the item **right medication** may be associated with dispersive factors in the work environment, ambience, disposition of inputs, nursing performance in the care unit and absence of a nursing care planning, with repercussions on high percentages of errors in therapeutics.

Regarding the item **right dose**, a study similar to the present one identified that the lack of verification of this item caused high error rates (49.1%)[15]. Differing data were observed in a national and international study, namely: Rio Grande do Sul, Brazil (16%) [16], Vietnam (11%)[14].

Regarding the item **right time**, studies showed that the time error is the second most frequent event, culminating in rates of up to 69.75%[17-18]. However, it is explicit in the literature that every drug should be prepared in a schedule that ensures its administration, so as to ensure the proper effect during therapy[6].

Based on the lack of records in some medical records on the medication administration process, in the present study, it is up to the professional to follow the regulations, as well as to be responsible for the reliable and complete registration as established by the Professional Code of Ethics[18].

For cases in which the anticipation or delay occurred in the administration of the medicine, there must be agreement with the higher level professional, be it a nurse or a doctor[6]. Despite this, it was observed in the present study that in the cases of anticipation or delay, no professional who administered the medication sought this agreement. It is inferred that facts such as these are due to the lack of time and the multiple activities performed by the professional, which leads to decision making, which can sometimes endanger the integrity of the patient.

Besides that, acts of this nature cannot be considered as a habitual failure, the nursing team should plan their work routine, prioritizing essential actions that guarantee the safety of patients, especially in intensive care units.

Regarding the item **right patient**, a study carried out in a hospital in the northern region of Brazil had the same understanding with the present study, showing that in 61.2% of the administered doses, the patient's identification was not checked[6].

It is highlighted that failures in patient identification are responsible for a considerable portion of errors. A survey conducted by the Brazilian Ministry of Health suggests that in the institutions, the use of identifiers in the bed corresponds to 75.9% and the use of handles or bracelets in the forearm corresponds to only 23.8%[6].

Among the patients, participants of this research, who did not present lowering of the level of consciousness, none of them were questioned about their identity. A study carried out at an oncology service in the UK shares this reality, justified by the lack of collaboration of the patients in informing name and date of birth again and again, as well as the self-confidence of nurses, which comes from providing care to the same patient during their stay in the care unit, which may be long-lasting[19].

The Safety Protocol on prescription, use and administration of medicines suggests that every practitioner should ask the patient prior to administering the drug his/her full name and add at least two identifiers to confirm his/her identity[6]. In this way, it is noticed that the non-conferring of the patient's identity represents a fragility, due to the omission of this item of verification, which could be resulting in high error rates, transgressing the patient's safety.

On the other hand, the vulnerability to error is further evidenced by the disuse of identification wristbands, especially for patients unable to express a verbal response. In this way, the use of this identifier must be considered, since it constitutes an effective barrier to patient safety.

On the other hand, although the safety protocols mention that every nursing professional in administering the medications should explain to the patient the action and reason for the prescription[20], for the present research, the item **right guidance** did not present adhesion, since most of the professionals did not orient the patient on the medication administered, name and expected effects, regardless of the level of consciousness or presence of companion.

The context presented, through the results, is worrisome since it interferes in the quality of care offered in the health service, a situation that decreases the chance of producing desired and coherent results such as professional knowledge. Moreover, the low adhesion in most of

the verification items indicates undesirable or inadequate assistance, which compromises the quality and the improvement of safe practices in the unit studied.

CONCLUSIONS

Although some actions have a desired adhesion rate and professionals execute the strategies established by the patient safety protocol, the weaknesses found in the actions involving medication administration compromise the whole practice.

After analysis, the care was classified as safe in the consequent adhesion of the professionals to the right form and right via items, as well as the right care for the right patient, right medication, right dose, right registry, right orientation, and right time.

It is believed that the main limitation of the study was the use of the cross-sectional typology, which focused on the analysis of the constituent items of the instrument used. Thus, it was impossible to establish causal relationships such as the adequacy of professional dimensioning, the implementation of improvements in management actions, effective communication or the use of educational strategies, which are fundamental for the adhesion to safe practices.

It is expected that these results will subsidize nursing management, in order to devise strategies that will minimize the fragilities identified, in order to make the medication administration process safe. On the other hand, the results offer an important tool for teaching and hospital institutions, since they are a representation of the patient's safety culture in the state of Sergipe, since it is the largest public hospital institution in the region. It is expected that future discussions will promote the construction of a safety culture.

However, new researches must be carried out in order to better understand the factors related to the vulnerabilities found, this will allow a broad analysis on the subject in teaching institutions, care and in the scientific community.

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