
ANALYSIS OF INTRAVENOUS MEDICATION ADMINISTRATION IN SENTINEL NETWORK HOSPITAL

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ABSTRACT: The aim of the study was to identify the types and frequency of errors during the administration of intravenous medication. A Cross-sectional, observational study was carried out in three units of a hospital. Observations were conducted on 367 doses of intravenous medication, prepared by 35 nurse technicians. Data collection took place between January and August of 2008. Errors were grouped in the following categories: medication; patient; route; dosage; phlebitis check and catheter permeability. Results showed error rates present in all categories and of above 80% in the following: fail to check medication; fail to check catheter permeability; fail to check phlebitis presence. There were no errors related to route and dosage. Delayed medication in 69.75% of the doses possibly affected the expected therapeutic results of sodium ampicillin, furosemide and tenoxicam. The high error rates may have caused changes in the expected therapeutic result, giving chance for undesirable consequences for the patients

DESCRIPTORS: Medication errors. Nursing. Patient safety.

ANÁLISE DA ADMINISTRAÇÃO DE MEDICAMENTOS INTRAVENOSOS EM HOSPITAL DA REDE SENTINELA

RESUMO: O estudo objetivou identificar tipo e a frequência dos erros que ocorrem na administração de medicamentos intravenosos. Pesquisa transversal de natureza observacional em três unidades de um hospital. Observaram-se 367 doses de medicamentos intravenosos preparadas por 35 técnicos de enfermagem. A coleta de dados ocorreu entre janeiro e agosto de 2008. Os erros foram agrupados nas categorias medicamento, paciente, via, hora, dose, verificação de flebite e permeabilidade do cateter. Os resultados mostraram taxas de erros, em todos os setores e maiores de 80% para as categorias Não conferir medicamento, Não avaliar permeabilidade do cateter e Não avaliar presença de flebite. Não houve erros em via e dose. A administração do medicamento com atraso em 69,75% das doses, possivelmente afetou o resultado terapêutico da ampicilina sódica, furosemida e tenoxicam. As altas taxas de erros podem ter causado mudanças no resultado terapêutico esperado, podendo ocorrer consequências indesejáveis aos pacientes.

DESCRIPTORIOS: Erros de medicação. Enfermagem. Segurança do paciente.

ANÁLISIS DE LA ADMINISTRACION DE MEDICACIONES INTRAVENOSAS EN HOSPITAL DE RED CENTINELA

RESUMEN: La investigación tuvo como objetivo identificar el tipo y frecuencia de los errores en la administración de medicamentos intravenosos. Encuesta transversal, de naturaleza observacional sin intervención realizado en tres unidades de un hospital. Se observaron 365 dosis de medicamentos por vía intravenosa preparados por 35 técnicos de enfermería. Los datos se recolectaron de enero a febrero de 2008. Los errores fueron agrupados en las categorías medicamento, paciente, vía, hora, dosis, evaluar flebitis y permeabilidad del catéter. Las tasas de errores estuvieron arriba de 80% en la categoría No conferir el medicamento, No evaluar permeabilidad y flebitis. No hubo errores en vía y dosis. La administración con atraso en 69,75% de las dosis, posiblemente alteró la eficacia terapéutica de la ampicilina sódica, furosemida, tenoxicam. Las elevadas tasas de errores pueden haber provocado alteraciones en la respuesta terapéutica deseada, lo que aumenta el riesgo de eventos indeseados al paciente.

DESCRIPTORIOS: Errores de medicación. Enfermería. Seguridad del paciente.

INTRODUCTION

Patient safety in the hospital environment has generated worldwide debates and received many interpretations, one of which is that safety consists of reducing risks and unnecessary health care-related damage to an acceptable minimum. The latter refers to what is feasible considering the current knowledge, the available resources and the context in which the care was delivered, in contrast to the risk of non-treatment or other treatments. Among the available resources, medication is one of the most popular. However, adverse events and medication errors are frequent in the hospital environment.¹

Medication errors occur frequently in hospitals, and are classified as preventable adverse events, with or without the possibility of causing damage to the patients. In average, a hospitalized patient suffers at least one medication error per day.²

Among the many phases in the medication process, nursing is usually responsible for the administration of drugs, which is understood as "the act of giving or delivering a previously prescribed medication to a patient, using specific techniques that were previously recommended".^{3,9} As such, inadequate handling of drug therapy has drawn the attention of health professionals, especially because of its consequences, such as the aspects that can decrease the patients' safety and the therapeutic efficiency of the medication. Administration is the final phase in the medication system and offers the last opportunity to prevent an error in the patient's treatment process.⁴ In that sense, studies have shown that 38% of errors happen during the administration of the medication, and only 2% of errors are intercepted, making this phase in the process (directly linked to nursing) vulnerable in regard to promoting patient safety.⁴

In Brazil, studies on adverse events, which included errors in prescription, storage and administration, have already improved, being of special interest a study on intensive monitoring of antimicrobials in a Paraná hospital, which identified the occurrence of 91 adverse events, being 3.3% adverse reactions to medication and 7.7% medication errors.⁵ Meanwhile, in a university hospital in Ribeirão Preto, SP, 925 prescriptions were analyzed, with 21.1% presenting text erasures, and 28.2% presenting unclear information to the professionals. In another study,⁷ conducted in a reference public hospital in Minas Gerais, there

was an analysis of 4026 prescriptions with items containing potentially dangerous medication, which found 89.1% of problems belonging to four categories: absence of dosage and pharmaceutical form, poor readability and doubtful dosage.

It is claimed that nursing is at its most error prone state during the administration of medication therapy, not only because it is a phase that relies on many previous steps, but also because it is the last chance to detect an error, with the nurse and the patient (when conscious) representing the only barriers to stop it, in case it exists.⁴

Although the administration of medication is a procedure that demands complex knowledge, there are still hospitals (in spite of the rising awareness for patient safety concerns) where nursing carries it out as a simple task, assigned without distinction to nursing aides, nursing technicians or nurses, and understood as part of a routine.

Nowadays, it is recommended to go through "nine checks"⁸ focused on the patient: medication; route; dosage; time; record; knowledge of the action; dosage form; monitoring the effects. However, there are also other safety measures that include catheter permeability control and monitoring phlebitis in the venous system.

This study was focused on some variables that compromise safety during administration, such as time, route, dosage, patient and the correct medication, because they are classics in nursing education, along with the evaluation of peripheral venous catheter permeability and the monitoring of phlebitis in the venous access. In the same way, it was opted to evaluate only medication used by the intravenous route, which allows administration directly to the blood stream, through a main or peripheral vein. The option for the intravenous route happened because medication through this route has an immediate and, at times, irreversible action and, in case of an error, a greater damage potential. This route shows no sign of first pass effects, the patient response is quick and, in most cases, irreversible. From what has been shown, an observational study was conducted, aiming to identify the types and frequency of errors that occur during the administration of intravenous medication by the nurses and also to discuss the possible consequences for the patients.

METHOD

This is an observational study, guided by the observation technique, following the recom-

mendation that it is the technique with the highest active error detection rate among others, in the context of patient safety.¹

The study was performed in clinics with patients undergoing therapy with multiple drugs, more specifically, the Emergency Intensive Care Unit (ICU), Medical Clinic (MC) and Surgical Clinic (SC) of a public municipal hospital of the sentinel network. The chosen units receive a large demand of critical and potentially critical patients that go through an intense medication therapy. The first unit has seven beds and the other two, 20 beds each. Each studied unit has an identical composition, in spite of different complexity and sizing, with a part-time nurse and five nursing technicians per shift, with a work period of one 24 hours workday per week on a fixed day.

In the three units, the preparation and administration of medication, including intravenous, are conducted by the nursing technician responsible for the patient. First, the professional copies the prescription on adhesive tape and identifies the medication that is to be administered. The medication is prepared in the nursing station or next to the bed, since there is no proper dedicated space to prepare the intravenous medication. After the preparation, the professionals take the medication to the patient in trays identified with the bed number. The routine in these units consists of obtaining clearance of the medical prescription, which occurs until noon, then the prescription is taken to the pharmacy, which by 2 PM, distributes the medication for the next 24 hours. There is no satellite stock in the units.

The whole observation was carried out using a systematized checklist, based on the following categories: time; dosage; route; medication; patient; phlebitis presence and catheter permeability. According to these categories, an error was registered when the professional failed to check the medication against the prescription before the administration, failed to call the patients by their names and/or, in case of disabled patients (because of sedation, coma, among others), failed to check the name on the medical record, failed to administer the medication at the prescribed time, by the prescribed route, failed to test the catheter permeability before administering the medication and failing to check the peripheral catheter's insertion site for the presence of phlebitis before administering the

medication, as recommended by international guidelines.⁹

The administered dosage was taken as an analysis unit for the error. For each dosage, two mutually excluding situations were observed: The dosage was administered either correctly or incorrectly. However, in each dosage many types of errors could occur.

The sampling calculation to find out how many doses should be observed was made considering the amount of monthly doses in the units and it utilized the formula for sampling calculation of cross-sectional studies of finite populations, using a confidence level of 95%, an α of 0.05 and a critical value of 1.96, considering that 20% of the professionals can make an error (data estimated by the hospital records). 367 doses prepared by 35 nursing technicians were observed, in the three units, observing that there is no specific category for nursing auxiliaries and that, in those units, nurses do not administer medication routinely, leaving that activity to the technicians. They complied with the selection criteria of having a work period of over six months in the studied unit and also having at least one year of work in the profession, which affords them ability when administering medication. All of them signed an informed consent form. The mean age was 32 years, with an average time since graduation of 12.6 years.

Observations involved one technician at a time, who was then followed for at least three days, with an interval of ten days between each observation, until reaching a minimum of 10 intravenous medication doses per professional. The observation was carried out by the two researchers responsible for setting up the research proposal and took place between the months of January and February of 2008. This study was submitted for appreciation by the Ethics Committee at Rio De Janeiro Municipal Health Department, and approved (160^a/07 of the SMS-RJ)

Because it is a study in which the nursing professional is accompanied directly, observing the occurrence or non-occurrence of errors, every time an error was made, it was chosen to intervene, directing the professional to the correct and safe manner to administer the medication. In these cases, the observed error was recorded and there was an intervention by the researcher, explaining the incorrect administration. For that reason, data collection happened once every two weeks, at different times, in different teams.

The data was organized into databases, using Microsoft Excell 2007, and underwent statistical treatment, with measures of central tendency and dispersion. The categories were named for presentation as: fail to check route; fail to check dosage; fail to check medication; fail to check patient (which encompasses both calling the patient by name, when they are lucid, and checking the medical records otherwise); fail to check for phlebitis; fail to check catheter permeability and wrong time.

RESULTS

A total of 367 doses were observed, of 54 different medications, being administered and grouped mainly as Antimicrobial, antisecretory, analgesic, antiemetics, diuretics, anesthetics and anticonvulsants. No errors were found in route and medication dosage, leading to the removal of those categories from the results presented in the following Table 1.

Table 1 - Errors in intravenous administration by category and sector. Rio de Janeiro-RJ, 2008

Error categories	ICU(145)		MC(95)		SC(127)		Total(367)	
	n	%	n	%	n	%	n	%
Fail to check medication	136	93.79	93	97.89	126	99.21	355	96.73
Fail to check for phlebitis	117	80.69	95	100	109	86.61	321	87.47
Fail to check Permeability*	138	95.17	69	72.63	110	67.72	317	86.38
Fail to check patient	133	91.72	40	42.11	86	67.72	259	70.57
Wrong time	97	66.9	43	43.26	116	91.34	256	69.75

* Fails to check the catheter's permeability.

The category "fail to check medication" presented the highest error rate (96.73%), per unit. It should be highlighted that, in the ICU, among the different categories, the rates were above 70%, except for wrong time. At the medical clinic, the categories "fail to check patient" and "wrong time" had the lowest error rate: 42.11% and 45.26% respectively.

The predominant antimicrobial agente was sodium ampicilin (24 doses), the predominant antisecretory was raniditinchloridrate (137 doses), and the predominant analgesic was dipyrone (124 doses). However, even though the antimicrobials

were presented as the predominant medication group, the one that was observed individually the most was raniditine, with 137 doses, followed by dipyrone, with 124 doses, and bromopride, with 88 doses.

Table 2 shows there are only the seven prevalent medicines (out of 54 observed in total) and the distribution of administration errors. Except for dipyrone and tenoxican, all the other medicines were administered at the wrong time and the presence of phlebitis was rarely checked. All seven medicines had confirmed error rates of above 60% in all categories, except for "wrong time".

Table 2 - Errors in the intravenous administration of the prevalent medications. Rio de Janeiro-RJ, 2008

Medications	Fail to check medication		Fail to check phlebitis		Fail to check permeability		Fail to check patient		Wrong time	
	n	%	n	%	n	%	n	%	n	%
Ranitidine (68)	67	98.53	68	100	62	91.18	49	72.06	27	39.71
Dipyrone (61)	60	87.3	61	84.13	43	66.67	31	42.86	6	3.17
Bromopride (44)	42	95.45	44	100	42	95.45	33	75	25	56.82
Tenoxicam (23)	23	100	23	100	20	86.96	14	60.87	6	26.09
Hidrocortisone (19)	18	94.74	19	100	15	78.95	12	63.16	14	73.68
Ampiciline (13)	13	100	13	100	13	100	12	92.31	7	53.85
Furosemide (12)	11	91.67	12	100	8	66.67	7	58.33	5	41.67

During the technicians' observation, when administering the medication, it was possible to find that in all units there was the same work process, with few exceptions, where technicians are responsible for the direct care and the only nurse meets many demands, with the administration of medication not being a routine activity.

DISCUSSION

The categories in which errors occurred will be discussed separately.

Wrong time

The category "wrong time" presented an error rate of 69.75%. It is a category in which a error can change the therapeutic response to the medication. The intravenous route allows an almost immediate onset, a complete availability of the medication and an absolute control over the administered dose, in addition to the serum level maintained in the patient. The time when the medication should be administered is related to its half-life, which is the time necessary for half of the medicine to be eliminated from the body. The factors that affect half-life include the rates of absorption, metabolism and excretion. After six half-lives, more than 98% of the medicine has already been eliminated from the organism.¹⁰

Other factors are important, such as the beginning of the medication action, maximum or peak concentration and action length. The beginning of the medication action refers to the time interval that begins when the medication is administered and finishes when its therapeutic effects start. The beginning velocity varies, depending on the administration route and other pharmacokinetic properties.¹¹

Maximum concentration is reached when the absorption rate equals the elimination rate. However, the moment when maximum concentration is reached not always corresponds to the moment of maximum response. The duration of the action of a medication corresponds to the time in which it produces its therapeutic effect.¹²⁻¹³

Therefore, the half-life and the peak of action of a medication are directly related with the correct time of administration. In this sense, changing the time of medication administration can lessen its therapeutic effect, with consequences to the patient, depending on the medication.

In the case of hidrocortizone, 73.68% of the

administration were at the wrong time. The recommended dosage in adults is 2-3 mg/kg of weight, up to an interval of 4 hours (the ampoule can be of 100 mg or of 500 mg), which should be administered in at least 30 seconds, by intravenous or intramuscular route. It presents a half-life of eight to twelve hours. In this case, there was no harm to the patient, because the medicine has a long half-life.¹²⁻¹³

For bromopride, there were delays in 56.82% of the cases. After being diluted, bromopride can be administered to adults in doses of 10 mg in intervals of 12 or 8 hours, in accordance to medical orientation (maximum dose of 60 mg/day). When administered by intravenous route, it reaches serum peak in two hours and 30 minutes. Its elimination half-life is of four to seven hours. Therefore, in this case, there also was no harm to the patient, as this medication presents a long half-life time.¹²⁻¹³

Sodium ampicilin was administered with delay in 53.85% of cases. The indicated dosage is of 500 mg to 2 g, every six to eight hours. It presents a short plasma half-life of 60 to 90 minutes, a peak of action of one hours, hepatic metabolism and renal excretion, being eliminated also through hemodialysis. Therefore, the doses that were administered late may have caused an increase in bacterial proliferation and even bacterial resistance in the organism, since the ampicillin has a very short half-life.¹²⁻¹³

There was a delay in 41.67% of the furosemide doses. The diuretic effect of furosemide occurs until 15 minutes after the administration of the intravenous dose. The duration of action is of approximately three hours. The half-life is of approximately one to one and a half hours. It is believed that the patient could have been harmed, because even though it has a high duration of action (approximately three hours), it has a half-life of one hour, which can lead to the lessening of the therapeutic effect.¹²

It was found that 39.71% of ranitidine doses were administered late. Ranitidine has an action duration and half-life of up to three hours. Its dosage in adults is of 50 mg/dose every six to eight hours, up to a maximum dose of 400 mg/day. Therefore, it is thought that there was no harm done to the patient, since the medicine has a half-life of 3 hours.¹²⁻¹³

Tenoxicam was administered late in 26.09% of cases. The recommended dosage is of 0.5 mg/kg/dose/day. For adults a single 40 mg dose per day is ideal. The elimination half-life is of 72 hours. Total Plasma depuration is of 2 ml/min and its ac-

tion peak is of 120 minutes. Therefore, regarding the doses that were administered late, there was a possible decrease in the therapeutic effect.¹²

Dipyrone was administered late in 3.17% of the cases. The analgesic and antipyretic effects are reached 30 to 60 minutes after the administration, and usually last for approximately 4 hours. After the intravenous administration, half-life is of approximately 14 minutes. Therefore, in the case of dipyrone, which has a short half-life, there was possibly a decrease in serum concentration, which may have compromised the expected therapeutic result, leading to a decreased analgesic and/or antipyretic action.¹⁴

Fail to check medication

This was the category with the largest error rate (96.73%); an alarming fact, in the sense that an error with an intravenous medicine can generate serious consequences for the patients and even death. It is known that a significant number of medication errors occur as a result of similar packaging and/or similar names. Thus, before administering medication, it is crucial to check the name, concentration and dosage.¹⁵

It has been cited that 25% of medication errors occur due to similarities in the names of the medications, thus it is recommended that hospital institutions utilize technology, such as electronic medical prescriptions, bar codes and automatic medicine storage devices. However, regardless of the distribution system, the label must be read at least three times before taking the medication out of the patient shelf (cart, box), before preparation or measuring the prescribed dosage, immediately before administering the medication to the patient. One should never trust visual recognition without reading what is written on the ampoule label.¹⁶

It is recommended that the administered medication should be checked with the prescription before the administration, because there is a chance of alterations in the prescription, since there are many items in its composition. This action decreases the risk of administering medication that has been changed in its prescription or even suspended.¹⁵

In the studied institution, the technicians are responsible for direct care in activities that go beyond the administration of medication, bed baths, bandage change, following exams outside the sector and invasive procedures. This routine can cause work overload and, because of that, can cause an over-reliance in their own memories, since that,

most of the times, prescriptions mention medicines with which the professional is familiarized, by frequent preparation and by dilution standardization. Trusting memory can be understood as risk behavior that breaks with all recommendations previously presented; a resource used as a mechanism to deal with the workload.

In this study, prevalent medications, such as ranitidine, dipyrone and bromopride, when administered without a real need, could cause harm to the patients, such as headaches, in the case of ranitidine; hypertension, with dipyrone; drowsiness in the case of bromopride, in other words, the patient is exposed to medication side effects needlessly.¹³⁻¹⁴

Fail to check phlebitis

This category had an error rate of 87.47%, which is rather concerning, as, although phlebitis could not compromise the therapeutic result, administering it in an already inflamed vein may cause harmful effects on the patient, demanding interventions and even a prolonged length of stay. Phlebitis, one of the most frequent complications in intravenous therapy, is defined as the inflammation of a vein. Phlebitis signs include redness, pain and edema throughout the length of the vein. Phlebitis has three main causes: chemical, mechanical and bacterial. Chemical phlebitis is directly related to the administration of medication.¹⁷

It was found that, with the exception of dipyrone administration, the presence of phlebitis was not observed with any other medication. It is known that ranitidine is a medication with a pH of 6.7, being, therefore, slightly acidic. According to literature, the more acidic a medication, the higher the risk of chemical phlebitis. Ranitidine should be infused for at least five minutes, because the infusion speed leads to lower irritation of the vein wall, where cells are exposed for a lower time period to a below normal pH.¹⁷

Dipyrone has a pH of 4.0 to 7.0; tenoxicam, a pH of 6.6 and bromopride, a pH of 5.5 to 7.4. The same recommendation as for ranitidine should be followed, since these three medications have similar pH values.¹² Furosemide, on the other hand, has a pH of eight to nine and hydrocortisone, pH of seven to eight. After reconstitution, both presented a pH close to blood pH, thus, they can be administered without dilution. Sodium ampicillin has a pH of 3.5 to 6. This extremely acidic pH requires dilution of, at least, 150 mL.¹³

Medications with pH of five to 10, should be diluted with 100 ml of solution and those with pH of 3.6 to 5.0, diluted with 150 ml. Although the present study did not observed any medications with extremely acidic pH, it is noted that those with pH of 2.6 to 3.5 should be diluted with a volume of 200 to 250 ml.¹²

Preventing chemical phlebitis is a challenge for intravenous therapy. Literature suggests that the medication dilution is conducted in accordance to the pH: the more acidic, the more quantity of diluent.¹²

It should be noted that bacterial phlebitis is also common and can be prevented and detected during the medication administration phase, when the disinfection of the connections and bioconnectors is made, preventing the contamination of the vascular bed.¹⁷

Administering through a phlebitis affected vein may worsen the inflammatory situation. Therefore, vein evaluation is also a safety measure, because the earlier it is identified, the lesser the harm to the patient.¹⁷

Fail to check permeability

This category presents an error rate of 86.40%. The permeability check should be performed with the intention to verify if the catheter is pervious or if there was a formation of thrombus in its tip, which can be done by checking the stream of the infused solution. The most accurate method to check permeability is the evaluation of perfusion during the infusion of solutions. It is noted that for the administration of medications in peripheral access, it is recommended to check the permeability, aspirating 0.5 ml of blood in free flow and, if the catheter is pervious, inject sodium chlorate at 0.9% (physiological serum) in 5 ml. Next, the medication should be administered and, again, inject sedum chlorate at 0.9% in 5 ml. When resistance is felt during aspiration with physiological serum, obstruction should not be forced, because it risks damaging the vascular endothelium and provoking an local inflammatory reaction which, possibly, will trigger phlebitis.¹⁷

Fail to check the patient

This error rate was of 70.57%, in other words, only in 108 doses (30%) there was attention to check the patient's complete name, through the medical record (for those sedated, unconscious or

otherwise) or checking with the patient personally, when lucid. The patients were identified only by their bed number, since ID bracelets with their registration and full name were not available. It is noted that referring to the patient by their bed number remains a common method of communication between health teams, which can cause serious communication problems, between teams and patients as well.

It is stressed that health professionals must verify the patients' identification before conducting any procedure. The use of identification signs for the patients, in visible placements to the team, and identification bracelets, are also important steps to avoid medication errors. Especially for sedated patients and those who cannot answer to the nursing team, the patient should always be asked about their full name and patients with similar names should not be in the same unit. In the future, there is hope for the implementation of automated systems, such as bar codes, which are already present in some institutions in Brazil, or identification by radio frequency, which is a technology still to be achieved by health services.¹⁷⁻¹⁸

There still persists the habit, in institutional nursing, to not refer to the patient by the name. Nursing has the habit of associating bed number to the patient's first name. For example, "Mr. José of bed 1", or "Mrs. Maria of Bed 2". When patients with similar names are present, the professional that reports the last 24 hours almost always calls attention to the fact, but in an informal way, with no established routine.

Results show that the Medical Clinic technicians showed the most care in checking the patient's full name, and the ones who showed the least care were the ones in the IU, maybe because they know that patients' cannot switch beds; Unless the nursing does it, which only happens for structural reasons. However, in that unit there is a high occupation rate, which, when combined with the admissions and discharges every 24 hours, can confuse the nursing's control of the patient's names.

Errors related to failing to check medication or failing to check the patient, and wrong time, seem to be related to how nursing got used to organizing the working process to deal with the workload and to a slow medication system. One aspect is evident and refers to the fact that these errors seem to reflect the same performance pattern by the professionals, since there no differences were observed in the process of administration of medication in the units.

Finding elevated rates in almost all studied categories, with a similar performance pattern among the units, confirms the idea that generally most errors has a systemic origin, possibly in the work process. The systemic view of errors considers that men are fallible and that all organizations, including those that excel in safety, will eventually deal with a certain error rate. This approach makes it evident that errors are consequences, and not causes, giving a large importance to system safety.

However, errors related to failing to check the catheter permeability and failing to check for phlebitis may not be explained through the working process, since they are widely spread recommendations in the technicians' training. It is thought that not all errors can be classified as systemic, and those that have as cause a risk behavior due to omission, negligence, should be approached in a different way, so that professionals are aware of the responsibility of their actions. Therefore, it is necessary to understand that a non-punitive environment does not equal tolerance to intentional acts that do not fit the good practices of professionals who do not follow safety protocols in a willing and/or recidivating manner.

Maybe many of the errors observed here do not cause serious consequences to the patients. They should be studied to avoid their relapse and their contribution to prolonged hospital stays, adverse effects or even death. In this sense, it should be noted that among the main initiatives to improve safety in the medication use system in health institutions is the establishment of an institutional commitment to create a safety culture, promoting the notification of errors in a non-punitive environment.¹⁸

In the hospital environment, the rational and safe use of technologies, including medication, go through many processes, which, in general, are fragmented. Hospital care is multidisciplinary, based in much technological knowledge and in much information about the patient and, in general, is a consequence of interrelated decisions, but, above all, it is where the professional cultivates a *modus operandi* that makes the whole work. However, when dealing with complex situations, a high rate of errors is expected.¹⁹⁻²⁰

CONCLUSION

This study found high error rates in all sectors and categories, with the exception of those related to dosage and route, in which no errors were

observed. In this sense, it worked as information to diagnose an institutional situation, alerting nurses to the need to assure safety in the medication process, with initial changes starting in the professionals' education. The hospital has been training all technicians of all units to stop referring to patients by their bed numbers and to transcribe prescriptions, mark prepared medication with labels, to confirm the patient's name with the records or by asking them, to check the catheter permeability in peripheral venous access, as well as identifying signs of phlebitis. Even though isolated education is not sufficient to reduce errors, it has an important role when combined with other resources, among which, the creation of a safety committee of the multiprofessional patient, which should serve as basis and be present in day to day life of the hospital, the health team, the patients and families.

Further studies related to medication errors should be performed, and associated to the nursing working process, such as the effect of technology in the prevention of error, such as, for instance, the access to labels to identify medication. The final effect is not totally foreseeable, but it is fundamental to study its impact, especially, associated to nursing work.

It is known that the study has an important limitation when it comes to sampling a single hospital, the short time for data collection and the number of observed professionals, which restricted the generalization of the results. At the moment, a replication of the investigation is being carried out in two other municipal hospitals.

Regardless of the limitations, the study brings advancements to nursing, in so far as it contributes to national literature about the administration of medication by the nursing staff, studying, beyond some classical variables, those related to catheter permeability and phlebitis assessment, and offers elements that contribute to study the relation among errors, work organization habits and institutional responsibilities, aiming to improve the quality of patient care.

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