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Article

Errors involving medication exchange in the process of dispensing in a hospital: which classes of medication are involved?

Erros envolvendo troca de medicamentos na dispensação de um hospital: quais classes de medicamentos estão envolvidas?

Jéssica Octávia de Morais[1], Jordânia Ferreira Martins[2], Lays Cássia Santos Duarte Melo[3], Lorena Aguiar Soares[4], Cristina Sanches[5], André Oliveira Baldoni[6], Mariana Linhares Pereira[7]

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ABSTRACT: Errors can occur in the process of prescription, dispensing and administration of the medication. One of these errors occurs when the medications are exchanged at the time of dispensing and, thus, there may be a failure in treatment and/ or risk to the patient. The purpose of this study is to identify the main classes of drugs involved in this type of error. For this study, the error record was used, which consists of the notifications from the period 01/12/2009 to 07/14/2019 of a medium-sized hospital of Minas Gerais, and each medication of these errors were classified according to the anatomical-therapeutic-chemical class. Among the total errors (N= 3937) reported by the three pharmacies in the hospital, 755 (19.18%) errors related to the exchange of medicines were observed, which the "Look-Alike" and "Sound-Alike" corresponded to 303 errors (40.13%), anti-infectious agents to 238 errors (31.52%) and high-alert medication to 189 errors (25.03%), representing the most medication errors of this study. In this way, the automation of the service and the continuing education of health care professionals are one of the alternatives to avoid these errors and promote favorable clinical outcomes for patients.

KEY WORDS: Medication errors; Hospital; High-Alert Medication Error; Look-Alike Sound-Alike Drug Substitution Errors.

RESUMO: Erros podem ocorrer nos processos de prescrição, dispensação e administração do medicamento. Um destes erros se dá pela troca de medicamentos no momento da dispensação e dessa maneira, pode haver falha no tratamento e/ou risco para o paciente. O objetivo deste estudo é identificar as principais classes de medicamentos envolvidas neste tipo de erro. Para o mesmo, foram utilizados registros manuais de erros de dispensação, que consiste nas notificações do período de 01/12/2009 a 14/07/2019 de um hospital de médio porte de Minas Gerais, e, classificou-se cada medicamento desses erros de acordo com a classe anatômico-terapêutico-química - em inglês *Anatomical Therapeutic Chemical* (ATC). Dentre o total de erros (n=3937) notificados pelas três farmácias do hospital, observou-se a ocorrência de 755 (19,18%) erros relacionados com a troca de medicamentos, sendo que os medicamentos do tipo "*Look-Alike*" e "*Sound-Alike*" (LASA) (N=303; 40,13%), os agentes anti-infecciosos (N=238; 31,52%) e medicamentos potencialmente perigosos (N=189; 25,03%) estão envolvidos na maioria dos erros deste estudo. Dessa maneira, a automatização do serviço e a educação continuada dos profissionais da saúde são umas das alternativas para evitar esses erros, promover segurança do paciente, contribuindo com desfechos clínicos favoráveis aos pacientes.

PALAVRAS-CHAVE: Erros de medicação; Hospital; Medicamentos potencialmente perigosos; Erros de medicamentos com semelhança ortográfica ou fonética.

1. Universidade Federal de São João del- Rei, ORCID: https://orcid.org/0000-0002-8937-8362, EMAIL: jessicaoctavia10@yahoo.com.br
2. Universidade Federal de São João del- Rei, ORCID: https://orcid.org/0000-0002-5707-6175, EMAIL: jordaniafmartins@hotmail.com
3. Universidade Federal de São João del- Rei, ORCID: https://orcid.org/0000-0003-3282-0997, EMAIL: layscassia2@hotmail.com
4. Universidade Federal de São João del- Rei, ORCID: https://orcid.org/0000-0002-7563-9015, EMAIL: lorenaaguiar15@hotmail.com
5. Universidade Federal de São João del- Rei, ORCID: https://orcid.org/0000-0002-8562-1337, EMAIL: csanches@ufsj.edu.br
6. Universidade Federal de São João del- Rei, ORCID: https://orcid.org/0000-0001-6379-0415, EMAIL: andrebaldoni@ufsj.edu.br
7. Universidade Federal de São João del- Rei, ORCID: https://orcid.org/0000-0002-3214-2789, EMAIL: marianapereira@ufsj.edu.br
Correspondence: Rua Sebastião Gonçalves Coelho, 400 - Chanadour, Divinópolis - MG, 35501-296. Email: jessicaoctavia10@yahoo.com.br

INTRODUCTION

In hospitals, the medication chain, understood as the route of the medication to the patient, involves several health professionals and includes steps such as prescription, dispensing, and administration. In any of these stages, errors may occur that may compromise the effectiveness and/or safety of the pharmacological treatment[1].

According to the World Health Organization (WHO), an unintentional failure to execute a desired plan, such as omitting a step, or executing an incorrect plan, such as adding an unnecessary step to the process, is considered an error[2]. Therefore, these failures can worsen the patient's health status, increase their length of stay and generate unnecessary costs to the public or private health system[3].

Due to the exacerbated use of medications in everyday life, the probability of errors occurring increases. In this way, patient safety must include strategies to avoid physical, psychological and/or social damage caused to the patient due to these failures[4].

According to Volpatto et al.[4], understanding that an error is likely to happen and what its consequences are, helps in its prevention. This is due to the improvement of professionals involved in care through continuing education and optimization of the process[4]. According to the WHO, medication incidents can be classified as "with damage", "without damage", and "near miss", that is, the one that could have happened, but was identified before its occurrence[2].

All medications and supplies are subject to the occurrence of errors, however, some require greater attention. The Institute for Safe Medication Practices (ISMP) created a list with those considered potentially dangerous and that can cause irreversible damage to the patient resulting from misuse[5]. In addition to these, antimicrobials need special attention, due to the increase in resistant bacterial strains in hospitals[6]. Finally, "Look-alike, Sound-alike" (LASA) medications, which have names with similar spelling or phonetics, can cause exchanges and consequently, damage[7].

Thus, it is necessary to identify the clinical value of these errors and create barriers for their containment[7]. Safety barriers are those used to prevent or minimize errors by the work team and prevent damage from reaching the patient. Some of these barriers include double checking, creation of protocols such as the one for handling potentially hazardous medications (PHM), and review of prescriptions by clinical pharmacists[5-8-9].
In this context, the present study aims to identify the main ATC classes involved in errors in the dispensing of the type of medication exchange.

MATERIALS AND METHODS

This is a descriptive study, with retrospective data collection, carried out in a hospital located in a city in the mid-west of Minas Gerais. It is a medium-sized hospital with 109 active beds. It is a tertiary-level institution, accredited to care for medium-complexity patients, which serves the Public Health System (*Sistema Único de Saúde* - SUS), health insurance, and also private. The hospital has a Pharmaceutical Supply Center (Central de Abastecimento Farmacêutico - CAF) and five satellite pharmacies, of which three (Medical Clinic, Central Pharmacy and Surgical Block 2) register errors that occur with medications. It performs two types of dispensing: unit dose per hour and unit dose for 24 hours, depending on the sector.

In the routine of this hospital, medications and supplies are dispensed manually and when a dispensing error occurs, employees report the incidents voluntarily to pharmacy assistants (Figure 1) and these record the occurrence, handwritten in a book, describing the following information: date of dispensation, name of the requested medication, quantity of the requested medication, medication sent, quantity of the medication sent, person responsible for the registration and for the dispensation, and justification for the error; it is not possible to identify, in most cases, whether the medications or supplies were administered/used on the patient. Data analysis was carried out using a secondary source of information and the records of errors that occurred in the hospital are from December 1st 2009 to July 14th 2019.

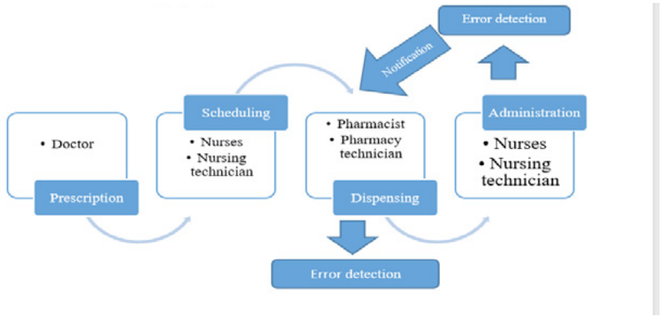

Figure 1 - Representative flow of the medication chain in a medium-sized hospital in the mid-west of Minas Gerais.

Medication involved in medication switching incidents were classified according to the Anatomical Therapeutic Chemical Code (ATCC) – WHO Collaborating Center for Drug Statistics Methodology[10], being potentially dangerous medications according to the ISMP BRAZIL list[9] and identified according to their similarity in spelling or phonetics on the LASA[9-10] list.

The data were tabulated using the Microsoft Excel 2019® application and, based on the data, a descriptive analysis was performed and tables were plotted, exposing the data in absolute and relative frequencies.

RESULTS

From December 1st 2009 to July 14th 2019, 3937 error notifications involving medications in the hospital of this study were analyzed. Of these, 755 (19.18 %) were "medication switching" errors. The satellite pharmacies that made the most notifications of this type were (ranked by number of occurrences): central pharmacy (480- 63.58 %), internal medicine (255- 33.78 %) and the surgical complex 2 (20- 2.65 %).

Based on the ISMP BRASIL[9] medication list, it was observed that 189 (25.03 %) errors of the "medication switching" type involved PHM. In this type of error, two medications are involved in each occurrence: the medication that was requested and the medication which was delivered. Thus, the 189 errors involved a total of 378 medications. It should be noted that two different situations can occur: each error may involve two PHMs or involves one PHM and not the other[9]. It was also found that the highest number of occurrences with PHM occurred with 158 (41.79 %) medications that act on the blood and hematopoietic organs (ATC B), followed by 152 (40.21 %) medications that act on the cardiovascular system (ATC C) and 46 (12.17 %) on the nervous system (ATC N) according to the first level of the Anatomical Therapeutic Chemical (ATC) classification[10].

The medications that were most frequently involved in errors were: Saline solution (Sodium chloride)/dextrose saline (glucose) (87 – 11.52 %), Cephalotin/Ceftriaxone (38- 5.03 %), Floratil®/Fluimucil (25- 3.31 %), Furosemide/Ranitidine (22- 2.91 %) and Levofloxacin/Ciprofloxacin (13- 1.72 %). Of the years analyzed, 2010 had the highest number of errors (131- 17.35 %), followed by 2012 (100- 13.24 %), and 2011 (83- 10.99 %) (Table 1).

Table 1 - Total dispensed medications and total errors involving medication changes per year in a medium-sized hospital in the mid-west of Minas Gerais (Dec 1st 2009 to Jul 1th 2019).

Period	No of medications dispensed	Total number of errors	Errors due to changing medications	%
2009*	48,124	28	3	0.40
2010	587,798	571	131	17.35
2011	589,054	358	83	10.99
2012	594,551	318	100	13.24
2013	563,874	355	80	10.60
2014	522,423	249	51	6.76
2015	559,766	383	62	8.21
2016	538,059	386	53	7.02
2017	510,673	372	49	6.49
2018	647,781	507	82	10.86
2019**	409,356	410	61	8.08
TOTAL	5,571,459	3937	755	100

(*) Error notifications began to be documented by the hospital on December 1st 2009. (**) The data used in this study were collected until July 14th 2019.

When evaluating the medication ordered and sent, it was found that most exchanges were made for another medication of the same ATC class (Table 2).

Of the total errors involving two different medications, there was a predominance of those that act as anti-infective agents (ATC J) in the blood and hematopoietic organs (ATC B), and in the cardiovascular system (ATC C) (Table 3).

Among the 238 (31.52 %) errors involving antimicrobials (class J) (Table 2) and the 189 (25.03 %) errors involving PHM (data not shown), the authors chose examples to present, that had similar names or phonetics (Table 4).

Table 2 - Comparison of classes of medication prescribed and sent according to the Anatomical Therapeutic Chemical System (ATC) of a medium-sized hospital in the mid-west of Minas Gerais (Dec 1st 2009 to Jul 14th 2019).

Class sent / Class prescribed	J	B	C	A	N	R	V	H	M	P	S	TOTAL
J	155	4	2	17	5	2	1	11	4	-	-	201
B	2	102	4	3	1	2	31	-	-	-	-	145
C	2	7	62	22	7	4	-	5	4	-	-	113
A	9	2	17	17	15	23	1	10	-	-	-	94
N	5	4	17	15	36	1	3	2	4	1	-	88
M	3	4	4	4	5	2	1	3	9	-	3	38
H	14	1	8	1	2	1	0	2	5	-	-	34
R	1	-	3	9	2	7	-	-	-	-	-	22
V	1	11	2	1	1	-	2	-	-	-	-	18
P	-	-	-	-	1	-	-	-	-	-	-	1
G	-	-	-	-	-	-	-	1	-	-	-	1
TOTAL	192	135	119	89	75	42	39	34	26	1	3	755

Digestive System and Metabolism (A); Blood and hematopoietic organs (B); Cardiovascular system (C); Genitourinary system and sex hormones (G); Systemic hormone preparations, excluding sex hormones and insulin (H); General anti-infective agents for systemic use (J); Musculoskeletal system (M); Nervous system (N); Antiparasitic products, insecticides and repellents (P); Respiratory system (R); Sense organs (S); Unidentified class (V)

Table 3 - Classification of medications involved in errors according to the Anatomical Therapeutic Chemistry System (ATC) in a medium-sized hospital in the mid-west of Minas Gerais (Dec 1st 2009 to Jul 14th 2019).

ATC Classification	Definition	Number requested	%	Number sent	%
A	Digestive System and Metabolism	94	12.45	89	11.79
B	Blood and hematopoietic organs	145	19.20	135	17.89
C	Cardiovascular system	113	14.97	119	15.76
G	Genitourinary system and sex hormones	1	0.13	-	-
H	Systemic hormone preparations, excluding sex hormones and insulin	34	4.50	34	4.50
J	General anti-infective agents for systemic use	201	26.62	192	25.43
M	Musculoskeletal system	38	5.03	26	3.44
N	Nervous system	88	11.66	75	9.93
P	Antiparasitic products, insecticides and repellents	1	0.13	2	0.26
R	Respiratory system	22	2.91	42	5.56
S	Sense organs	-	0	3	0.40
V	Unidentified class	18	2.38	39	5.16
TOTAL		755	100	755	100

Digestive System and Metabolism (A); Blood and hematopoietic organs (B); Cardiovascular system (C); Genitourinary system and sex hormones (G); Systemic hormone preparations, excluding sex hormones and insulin (H); General anti-infective agents for systemic use (J); Musculoskeletal system (M); Nervous system (N); Antiparasitic products, insecticides and repellents (P); Respiratory system (R); Sense organs (S); Unidentified class (V).

Table 4 - Example of "Look-alike" "Sound-alike" (LASA) medication switching errors involving anti-infective agents and potentially dangerous medications in a medium-sized hospital in the mid-west of Minas Gerais (Dec 1st 2009 to Jul 14th 2019).

Medication Requested	Medication Sent	Medication Requested	Medication Sent
Heparin (Heparina)	Gentamicin (Gentamicina)	Omeprazole (Omeprazol)	Propranolol (Propranolol)
Aminophylline (Aminofilina)	Ampicillin (Ampicilina)	Regular Simple Insulin (Insulina Regular Simples)	NPH Insulin (Insulipa NPH)
Oxytocin (Ocitocina)	Oxacillin (Oxacilina)	Marevan®	Diazepam (Diazepam)
Hydrocortisone (Hidrocortisona)	Ceftriaxone (Ceftriaxona)	Warfarin (Varfarina)	Heparin (Heparina)
Amitriptyline (Amitriptilina)	Azithromycin (Azitromicina)	Heparin (Heparina)	Gentamicin (Gentamicina)
Clindamycin (Clindamicina)	Amoxicillin (Amoxicilina)	Heparin (Heparina)	Ranitidine (Ranitidina)
Ciprofloxacin (Ciprofloxacino)	Levofloxacin (Levofloxacino)	Deslanoside (Deslanosídeo)	Dexamethasone (Dexametasona)
Levofloxacin (Levofloxacino)	Levothyroxine (Levotiroxina)	Amiodarone (Amiodarona)	Aminophylline (Aminofilina)
Ampicillin (Ampicilina)	Penicillin (Penicilina)	Norepinephrine (Norepinefrina)	Nitroglycerin (Nitroglicerina)
Oxacillin (Oxacilina)	Ampicillin (Ampicilina)	Dobutamine (Dobutamina)	Dopamine (Dopamina)
Oxacillin (Oxacilina)	Polymyxin (Polimixina)	Nitroprusside (Nitroprussiato)	Nitroglycerin (Nitroglicerina)
Cephalexin (Cefalexina)	Azithromycin (Azitromicina)	Teicoplanin (Teicoplanina)	Enoxaparin (Enoxaparina)
Cephalotin (Cefalotina)	Cefazolin (Cefazolina)	Diazepam (Diazepam)	Midazolam (Midazolam)
Cefazolin (Cefazolina)	Ampicillin (Ampicilina)	Morphine (Morfina)	Pethidine (Petidina)
Ceftriaxone (Ceftriaxona)	Hydrocortisone (Hidrocortisona)	Morphine (Morfina)	Metformin (Metformina)
Cefepime (Cefepime)	Ceftazidime (Ceftazidima)	Diazepam (Diazepam)	Digoxin (Digoxina)

DISCUSSION

Among the dispensing errors identified during the study period (3937), those due to medication changes represented 19.18 % (755) of the cases (Table 1). Studies show that errors involving medication can affect between 1.6 and 41.4 % of patients and generate additional costs of 25 to 35 million dollars per year for highly complex hospitals[11-12]. From a clinical point of view, these errors can either be irrelevant or cause irreversible harm to the patient[9].

In this study, 392 (51.92 %) errors were caused by one medication being exchanged for another of the same class (Table 2), however, this does not exempt the patient from being affected by damage such as hypersensitivity and therapeutic ineffectiveness. Medications from the same therapeutic class are not interchangeable in terms of effectiveness and safety, even with similar pharmacodynamics[13]. Furthermore, it is important to highlight that errors due to medication changes culminate in another type of error, such as omission, since the medication that should have been sent is replaced by another, which in turn may not perform the same function, leading to discontinuation of therapy or causing an adverse event[14].

In this study, errors involving the class of anti-infective agents (ATC J) represented 31.52 % (238) of the total (Table 2), being responsible for most notifications, unlike the study carried out by Dalmolin et al.[15] who observed that the medications most reported in errors are from the class of medication that act on the blood and hematopoietic organs (ATC B) and on the nervous system (ATC N)[15]. Thus, it can be inferred that the hospitals have different error profiles, and this may be associated with the logistics of dispensing and with the profile of medications that make up the list of each hospital. Furthermore, it is important to emphasize that this most common error can favor the occurrence of bacterial resistance and a greater probability of ineffectiveness in the treatment of infections, increasing costs and compromising patient safety.

In this context, the WHO has created urgent goals to contain the damage caused by bacterial resistance, which include actions to optimize the correct use of medication. In addition, the WHO warns that by 2050, infections will be the cause of 10 million deaths per year, and by 2030 they will lead up to 24 million people to extreme poverty. In the current scenario, 700,000 people die annually from medication-resistant diseases. The economic damage generated may be similar to the world crisis of 2008-2009[6].

The Ministry of Health[16] and the National Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária* - ANVISA)[8] suggest that, in order to contain the development of new bacterial strains, it is important to reduce the number of antimicrobial prescriptions, review prescriptions with the help of infectologists and clinical pharmacists, readjust the therapy according to the results of microbiological tests, restricting the use of these medications to specific cases only, educating the population about the problem, using shorter treatment regimens, using antimicrobials in association, promoting heterogeneous use, and researching new medications.

From the ISMP[9] list of potentially dangerous medications, 189 (25.03 %) exchange errors involving PHM were observed. Errors involving PHM are more serious when they occur in a hospital environment than when they occur in an outpatient environment, mainly due to the worse clinical condition of hospitalized patients. Thus, it is necessary to focus on the entire process: packaging, identification, storage, prescription, dispensing, preparation, and administration[1].

The highest number of errors in this study was with the pair of medications dextrose saline and saline solution (sodium chloride) (N=87; 11.52 %). Dextrose saline is used intravenously to treat cases of hypoglycemia, dehydration, and for nutritional replacement. In addition, it is used as a diluent for injectable medication. In the case of hypertonic solutions (50 % glucose), it is classified as PHM[9-17]. Saline solution (sodium chloride) is used to replace ions, hydrate, and prevent cramps. During therapy with it, it is necessary to monitor fluid volume, electrolytes and acid-base balance. Hypertonic solutions (20 %) are considered as PHM[9-18]. Due to the incomplete filling out of notifications, it was not possible to identify whether all errors involved concentrations considered dangerous by the ISMP[9]. In this way, it is necessary to instruct the collaborators to correctly record the errors, so that it is possible to measure the damage caused to the patients.

In order to avoid errors involving potentially dangerous medication in the hospital of this study, the medication had colored labels showing their potential risk. Given the need to implement additional barriers to contain errors involving PHM, some measures in addition to this one that were already being implemented, must be taken, such as: correct identification of PHM packages containing the patient's name, medication name, dose and route; standardization of medications and doses to avoid memorization dependency; continued review of standardized medication specialties to prevent LASA-type errors; use corrective measures in risk situations such as storing the medication in a different place than usual and highlighting the difference in spelling with capital letters and/or bold; double checking; centralization of the process involving PHM; and an alert system in electronic prescription and dispensing[9-19]. These techniques can also be used in the process of dispensing antimicrobials, since they are also critical medications when it comes to microbial resistance.

Julca et al.[5] confirmed that double checking reduces the occurrence of errors, especially when dealing with potentially dangerous medications. This practice consists of checking the medication by two professionals simultaneously and independently, however, this technique is not standardized, which leads to a lack of control over its execution and optimization[5]. The hospital in this study performs this technique, but in some sectors there is only one professional at certain times, which makes it difficult to double check the medication.

In this hospital, it was shown that LASA-type medications are involved in several different pairs of errors. This error culminates in two different types of harm to the patient: omission of the requested medication dose and addition of a new medication to pharmacotherapy. The study by Basco et al.[7] evaluated the potential harm caused to children in a hospital by exchanging pairs of LASA-type medications. Out of 3550 medication pairs, 608 were selected for the study in which each medication was evaluated in three categories: No/Little Harm, Moderate Harm, and Severe Harm/Death. The results showed that errors with great potential for harm occurred infrequently and that only 34 % of errors reached the patient[7]. In agreement with this study, most of these errors were not frequent and, due to lack of information, it was not possible to know whether the error reached the patient, which made it impossible to assess the occurrence of damage caused by the exchanges.

Considering errors with medications and LASA-type inputs, only those involving anti-infective agents and potentially dangerous medications were exemplified (Table 4) to facilitate the insertion of these alerts in the clinical routine of this hospital. The automation of the process can reduce these errors due to the greater ease of reading of the prescriptions. Creating alerts with LASA is a good option, but priority should be given to those medications with greater potential risk, given that professionals tend to ignore high volumes of information in alert systems, with a phenomenon known as "alert fatigue"[7]. Despite contributing to the reading of prescriptions, it is still necessary to implement the computerized system in dispensing, a phase in which these errors occurred.

According to the WHO, investments in measures to reduce the risk of damage would be paid for with what would be spent on them in the future[6]. The costs of implementing the computerized system were compared to the cost of medication errors, which were approximately R$10 million and R$47 million, respectively[20]. Given this fact, it is clear that the cost of prevention is almost five times lower than the act of reversing the effects of the error.

It was verified that the electronic prescription system was implemented in this hospital in 2019. In the study by Volpatto et al.[4] it was evidenced that the use of electronic systems decreases the number of errors, as they reduce cases of illegibility and simplify communication within the team[4]. It is necessary to invest in technology to develop more organized systems to assist human work. Technologies can be classified as hard, represented by equipment; light, by human relations, and light-hard, by the union of both. The technology considered as hard demands great financial investment by the institutions, but this does not correspond to the reality of most Brazilian hospitals, which have limited capital for such investments. However, care must be taken so that these technologies do not distance the professional from the patient, distancing them from the care that involves interaction with the patient[20]. From this implementation, the probability of errors due to illegibility over the years, a possible cause of LASA-type errors, should be reduced. It should be noted that due to the hospital's insufficient resources, dispensing continues to happen through the manual process and therefore represents a challenge for error prevention.

In the hospital in question, continuous training is carried out for employees based on the data generated by the monthly error indicators. In addition, annual recycling of procedures is offered. Unfortunately, according to pharmacists' reports, there is still resistance from professionals to accept suggestions for improving the service. Julca et al.[5] noted that the professionals at the hospital where their study was conducted had not undergone any training in the previous year. Promoting continuing education in a practical, quick, and complete way is a challenge. In this way, using online tools, such as games, clinical simulations, and discussion groups, provide multidisciplinary contact and instigate the search for knowledge. It is necessary to instruct that discarding notifications can lead to the occurrence of similar problems and that notifications support new ways to prevent errors[4]. Errors must be reported voluntarily, with the involvement of the entire team, but there is underreporting due to fear of criticism, guilt, shame and punishment by the team and the patient's family. In addition, it is difficult to know when and how to report this error[1].

A worrying issue is the health of professionals. Professional demotivation, inattention, work overload, stress, insufficient number of professionals, tiredness, incorrect handling of medications, lack of updating in education and health, and an inadequate environment can lead to a greater probability of errors[21].

In this study it was not possible to identify the professional responsible for carrying out most of the notifications. It is only known that hospital employees, such as nurses, nursing technicians, pharmacy assistants, pharmacists, doctors, nutritionists and physiotherapists report the error when identifying it. According to Basile et al.[1], nursing professionals are those who report the most, as they are the ones who spend the most time in the hospital, are in greater numbers, spend more time with the patient, and are responsible for the greater number of steps until the medication administration.

Anacleto et al.[22] observed in their study that the number of pharmaceutical professionals in the hospital environment is scarce and that the procedure for checking the dispensed medications happened on few occasions. This corroborates the hospital's staff, which has only five pharmacists, who are responsible for monitoring the entire institution, making it very difficult to verify or clarify all doubts regarding the medications to be dispensed by pharmacy assistants, who are also in low numbers. The minimum number of pharmacists in this hospital is in accordance with the recommendations of the Brazilian Society of Hospital Pharmacy (*Sociedade Brasileira de Farmácia Hospitalar*), however these norms do not take into account the volume of dispensing according to the size of the hospital[23]. By calculating the average of dispensations from 2010 to 2018, there are approximately 568 thousand per year, 47 thousand per month, and 1.6 thousand per day (Table 1).

Borges et al.[21] suggest that for the assessment of damage, more consistent and complete data would be important, such as a form with information about the notifier (name, profession, unit), date of occurrence, type of insurance service plan, patient identification (unit of hospitalization, name and medical record), type of error and description. In addition to these, the reason for seeking the health service, the impact of the damage caused by the error, and the time of the occurrence (morning, afternoon or night)[14] are suggested. For this, it would be important to unite the notifications of dispensing and administration errors from the entire hospital into a single database.

To reduce errors and "near misses", Vilela and Jericó[20] suggest clinical pharmacy interventions in prescriptions since

pharmacists are the professionals responsible for the medication and are capable of adapting the prescription to the patient's needs. Along with the intervention, software programs help these decisions and act as a barrier by issuing alarms for interactions, dose, potentially dangerous and/or LASA-type medications[20].

The main limitation of this study is due to the incorrect and insufficient completion of the data provided. Most items lacked dose, route, pharmaceutical form, concentration, in addition to the fact that with the information provided, it was not possible to infer whether the medication had been administered or the process had been interrupted in time to prevent the consummation of the error. In this way, it is necessary to create more fields in the notification form for a more organized filling, in addition to making the team aware of the importance of this procedure.

It is important to emphasize that the data continue to be computed in the computerized system with additional information suggested by the authors of this article, and later a more in-depth and complete research can be carried out with the new data added.

Even if it is not possible to identify whether the errors reached the patient, the large number raises concerns about the possibility of this occurrence. Switches with potentially dangerous medication, anti-infectives and "Look-alike" and "Sound-alike" agents may be harmless, but they may alternately cause irreversible harm to the patient. The clinical condition of hospitalized patients does not allow mistakes, so it is necessary to identify the causes of errors and correct them.

The automation of the system and continued education of professionals are some of the appropriate alternatives to avoid new occurrences of errors. Investing in the service qualifies it, improves its quality, reduces costs, and builds trust in users and collaborators. Therefore, organization of professionals and financial support is necessary for the system to improve and contribute for favorable clinical outcomes for patients.

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