Analysis of similar drug labeling: potential medication errors

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Summary

Objective: This study aimed to examine drug packaging and labeling, identifying similarities among them that may lead to medication errors, which may occur by unintentional substitution, in different sectors of the pharmacy of a university hospital in northeastern Brazil. **Methods:** Cross-sectional observational study, which included 300 pharmaceutical presentations (150 pairs) that were photographed from May to December 2010. Concordance analysis of data related to the pictures of possibly similar packaging and labels was validated using the Kappa index. **Results:** Of all drugs evaluated (n = 150), about 43% of "possibly similar drugs" were in the central pharmacy (n = 65) and were related to small-volume parenteral solutions. The strength of interobserver agreement in the category "very similar to each other" was considered "satisfactory" (Kappa = 0584) in 90.66% of the drugs evaluated (n = 136). The overall Kappa analysis of the study was 0.488. Variables with statistical significance were: "same color label or packaging", with the respective percentages for both primary and secondary packaging (52%-44%), p = 0.028; the variable "same color of drug presentation" obtained similar values and statistical significance to the previous variable; for the variable "same arrangement of words", the values found for both packages were close to 50%, p = 0.001; and for the variable "same color of the words", the percentages were: (50.7% - 44%) (p = 0.008). **Conclusion:** Our results indicate similarities related to the labeling of drugs with potential for errors, especially in dispensing, storage, and administration if preventive measures are not adopted.

Keywords: Drug labeling; medication error; risk prevention program in the work environment

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Introduction

Generally, the term "patient safety" involves preventing errors in care and the elimination of damage caused to patients by such errors. Conceptually, healthcare errors are the result of nonintentional actions caused by some problem or failure while caring for the patient[1]. In this context, the National Health Surveillance Agency (ANVISA) has defined "medication error" as preventable event that can actually or potentially lead to inappropriate use of medication, which may or may not harm the patient. It may be related to professional practice, the product used, procedure, poor communication on prescription, labels, packaging, preparation, dispensing, distribution, and monitoring and may be the result of actions by any member of staff at any point in the care process[1,2].

Many paradigms are challenged when it comes to medication errors. Health professionals usually associate errors in their activities with shame, loss of prestige, and fear of punishment[2]. To contribute to the reduction of errors, one needs constant, careful and attentive analysis by health institutions of errors that effectively occur. In recent years, much has been said about the investigation of medication errors, as it is of fundamental importance to promote the reliability of the medication system and patient safety[3].

Carvalho et al.[4] reported that error prevention should be based on actual search for causes, which often include errors in service organization and implementation systems. Moreover, errors must be accepted as evidence of system failure and seen as an opportunity to review the process and improve the care provided to patients, as emphasized in the celebrated article *Éviter l'évitable. Tirer parti des erreurs pour mieux soigner*, which is translated into English as "Preventing the preventable. Taking advantage of errors to improve care"[5,6].

One of the explanations for the large number of errors observed in the hospital environment is exactly the lack of mechanisms to reduce its occurrence or to prevent the error before it reaches the final consumer (the patient). That is, one works with the premise that the health professional does not make mistakes and therefore mechanisms for error prevention and correction are not created [4].

In the hospital environment, the pharmacy is responsible for the safe and effective use of drugs and must comply with the essential role of integrating the processes of drug prescription, dispensing, and administration and must have policies and procedures to prevent them. In this sense, the error rate measurement is considered one of the best indicators of quality of a drug distribution system in hospitals and is used to evaluate the safety of these systems[7,8] According to Silotti et al.[9], together with the multidisciplinary team, the pharmacist active participation is an important strategy for error prevention, as he operates during the phases of selection, procurement, storage, distribution, dispensing, and monitoring, identifying the potential risks.

One of the points described as a trigger for drug dispensing and administration errors is the similarity of drug names and packaging. The Brazilian market still admits the non-compliance regarding the similarity of packaging and labels, which are almost mistakable, so that in hospitals in Brazil there are countless similar types of packaging and labels, leading professionals involved in drug dispensing and administration to unintentionally switch them. Merino et al.[10] consider in their study that for the safety of packaging and labels of similar drugs, it would be necessary, whenever possible, to avoid purchasing medications with similar appearance, and also incorporate other mechanisms to prevent errors, such as local adequate storage and even differentiated drug labeling.

Errors occur as a consequence of these similarities, which could be prevented with simple actions by the pharmaceutical industry. This problem has not been addressed by the Brazilian pharmaceutical industry, in order to promote a global action regarding the standardization of packaging and labeling of drugs, very often ignoring the important role it should play in improving the safe use of medications. Unfortunately, to date, there is no Brazilian law regulating the standardization of packaging and labels focused on similarity prevention, which would force the pharmaceutical companies to make changes, testing packaging and labels to maintain an appropriate standard in the various families of pharmaceutical drugs[11]. Even after reports of errors associated with similar names and packaging, the Brazilian studies assessing the extent of the problem are very incipient.

Consequently, this study aimed to assess the packaging and labeling of medications, identifying similarities between them that may lead to medication errors by unintentional substitution.

Methods

This is a cross-sectional observational study, carried out between May and December 2010, in a university hospital in northeastern Brazil, connected to the network of Anvisa Sentinel Hospitals. Data were collected using a sampling of photographic images, achieved through the calculation for cross-sectional studies, with a prevalence of 33% (percentage with which the phenomenon occurs, according to previous publications), with a sampling error of 5% (0.05 = level of significance), and a confidence level of 95% (expressed as number of standard deviation 1.96). We added 10% to the sample size due to the chance of losses and refusals, resulting in 300 pharmaceutical presentations, in 150 pairs.

We monitored a stored drug flow in the order established by simple randomization to define the areas of the hospital pharmacy to be visited and defined in the following sequence: central pharmaceutical supply (CPS), oncology unit, central pharmacy, surgical department pharmacy, fractionation unit, and outpatient clinic pharmacy.

The data collection tool and methodology to be used have been validated in a pilot study. The photographs were analyzed using a fully structured checklist type form, with dichotomous variables, which was filled out by direct observation of the available drugs in hospital sectors. Similarity cases were entered on database and characterized based on international references, such as the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP), Taxonomy of Medication Errors Now Available,[12] and Resolutions of the Collegiate Board (RDC) of the National Health Surveillance Agency – Anvisa (RDC N. 333/2003, 09/2001 and 71/2009)[13-15].

All trademarks and pharmaceutical preparations available at the hospital during the collection were included in the 150 pairs of drugs studied. The variables recorded included dosage forms and presentations, types of packaging, name, color, design, dosage, and pharmacological group according to the Anatomic Therapeutic Chemical Classification (ATC)[16], whereas suppliers and potential risk [high-alert medications (HAM)] were also verified, as well as controlled medications.

When analyzing the type of medication, we considered the names specified by Anvisa[17] for reference, generic, and similar drugs in which, according to the legal definition, the reference drug is the innovative one registered with the federal agency responsible for health surveillance and marketed in the country and whose efficacy, safety, and quality have been scientifically proven to the competent federal agency upon registration. The efficacy and safety of the reference drug have been demonstrated through clinical study presentation. Generic drug is one that contains the same active ingredient at the same dose and dosage form. It is administered by the same route and has the same safety level and therapeutic indication of the reference drug in the country; thus, reference and generic drugs are interchangeable.

As for similar drugs, they are those that contain the same active ingredient or ingredients, have the same concentration, dosage form, route of administration, dose and therapeutic indication, and are equivalent to the drug registered at the federal agency responsible for health surveillance and may only differ in characteristics related to size and shape of the product, shelf life, packaging, labeling, excipients and vehicle, and must always be identified by trade name or brand. Generic and similar drugs can be considered "copies" of the reference product. For registration of both generic and similar drugs, the submission of relative bioavailability and pharmaceutical equivalence studies are mandatory. The study also included medication with packaging from the Ministry of Health.

Association analysis was carried out using the Statistical Package for Social Sciences for Windows (SPSS), version 16.0. Statistical tests for significant associations were based on Pearson's chi-square (χ^2) or Fisher's exact test, considered to be statistically significant when < 5%.

Agreement was measured using Kappa statistics through the one-tailed test, verifying if there was agreement between the classifications, and the level of agreement of these hypotheses was reproduced from the null hypothesis H0: $k = 0$.

Statistical significance of the correlation was assessed by derivation and obtaining the p-value, with statistical significance set at $p < 0.05$. The Kappa index and 95% confidence intervals were also obtained. For interpretation of aggregation for the Kappa value, we adopted the criterion of Landis and Koch[18], being considered as perfect agreement a kappa value of 1.

The analysis of inter-observer agreement regarding the sample volume of packaging and label photos of possibly similar drugs was presented to three independent observers with experience in nursing and pharmacy, as follows: a female nurse (observer 1); a female pharmacist (observer 2); a male nurse (observer 3). They assessed, at different times, with a minimum interval of one week for each observer, a situation in which they compared labels and packaging of different drugs through pictures. The images were taken using a Samsung camera model SL820 IT/100 and identified through an alphanumeric code created specifically for the study, and inserted into the database in JPEG format, with 2048 x 1536 dimensions, and then randomly distributed to each observer. The observers, after receiving the images, performed the images classification using the following denomination: (1) very similar to each other, (2) somewhat similar to each other. and (3) there are no similarities.

Data were submitted to statistical analysis by determining the inter-observer agreement, based on interpretations of each case individually performed by observers. The inter-observer agreement was assessed by considering the single interpretation of each observer, thereby combining the three interpretations. Each observer recorded his/her assessment in an adequate form, while blinded for the assessment of the other observers.

Following the decision of the Research Ethics Committee of the hospital where the study was developed, report No. 039.05.10, the research project was deferred, as it did not involve human subjects, but statistical analysis of data from observers.

Results

Regarding the type of medication, the similar ones were the most frequently found (46%, n = 69) in the 150 pairs analyzed. The reference and generic drugs had values that were respectively 21.33% (n = 32) and 18% (n = 27); while medications with packaging from the Ministry of Health accounted for 14.67% (n = 22).

Figure 1 shows the prevalence of antimicrobials (anti-infectious drugs), including nucleosides and nucleotides reverse-transcriptase inhibitors, among the 24 therapeutic classes studied (28%, n = 42), followed by anesthetics (10.67%, n = 16) and antihypertensive drugs (6.67%, n = 10).

These medications were studied in different sectors of the hospital pharmacy, the central pharmacy accounting for the highest number of possibly similar drugs (43.33%, n = 65), followed by the outpatient clinic pharmacy (24.66%, n = 37) and the CPS (10.67%, n = 16).

Similar proportions were observed for the surgical department pharmacy and the in fractionation unit (8.67%, n = 13). As for the oncology unit, the percentage was much lower (4%, n = 6).

When analyzing the criterion "similarities", Table 1 shows three categories, namely: "very similar to each other", "somewhat similar to each other", and "no similarities." The strength of agreement ranged from poor to moderate (close to an agreement considered to be "good"; Kappa from 0.379 to 0.584). As for the "very similar" category, the inter-observer agreement was considered "satisfactory" (Kappa = 0.584) in 90.66% (n = 136) of drugs evaluated. In the category "somewhat similar to each other," the agreement was considered "weak" (Kappa = 0.379).

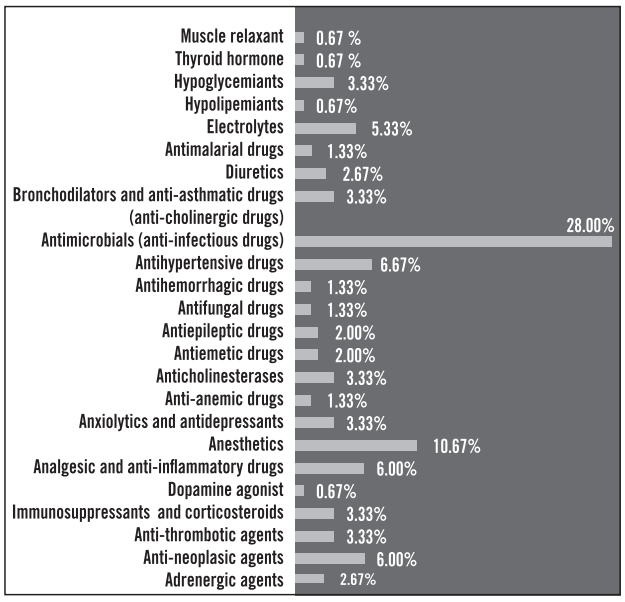

Figure 1 – Drug distribution regarding drug classes involved in the process of assessment of similarity between drug packaging and labels. According to ATC classification – Level II. Hospital Universitário, Fortaleza – CE, Brazil, 2010.

In the category "no similarities," the agreement was considered "moderate" (Kappa = 0.433). The overall Kappa analysis throughout the study was 0.488.

The results obtained in the analysis of similarities regarding drug packaging and labeling were stratified according to the printed data, design, procurement, and potential hazards associated with the drugs (Table 2). In the category "information printed on the labels", the variable "label" or "packaging of the same color" were identified in primary and secondary packaging of the drugs showing the following percentages 52% (n = 78) and 44 % (n = 66), respectively, (p = 0.028). For the other items, we observed the "same disposition of words" for both primary (46.7%, n = 70) and secondary packaging (44%, n = 66), with results that were also statistically significant (p = 0.001).

When analyzing "the same color of the words", a percentage of 50.7% (n = 76) was obtained for the primary and 44% (n = 66) (p = 0.008) for the secondary packaging.

Also in the category data printed on the labels, we analyzed the description of names and pronunciations, with the following results: the same percentage of 17.30% (n = 26) was found for similar names in the primary and secondary packaging. Moreover, when evaluating the same category, it was observed that the drugs with the same pronunciation had a value of 18% (n = 27) for the primary packaging and 19.30% (n = 29) for secondary packaging; no statistically significant results were found for these two variables.

In the "design characteristics" category, the variables investigated were "same size" and "same color". The following variables were found for "size" [primary (48%, n = 72) and secondary packaging (37.30%, n = 56) (p = 0,531)] and "same color of the pharmaceutical preparation" [primary (52%, n = 78) and secondary packaging (44%, n = 66) (p = 0.028)].

Other aspects of the pharmaceutical preparation were analyzed, such as material characteristics and data printed on the label or glass vial packaging, which accounted for 34% (n = 51) of the total dosage forms in the study. In this sample (n = 51), the following variables were evaluated: whether the vials were made of plastic or glass, if they had self-adhesive labels, or if they were printed. The plastic vials showed values close to 30% (27.45%, n = 14/51), whereas glass ones were prevalent, with more than 70% (72.55%, n = 37/51). As for identification, it was examined whether the vials were characterized with self-adhesive labels or if they were printed. For the self-adhesive labels, the percentage found was 58.82% (n = 30/51), while for vials with printed labels it was 41.18% (n = 21/51).

Regarding HAM comparative analysis, the primary and secondary packaging potential to cause damage was 26% and 14%, respectively, with p = 0.05.

Table 1 – Results of the Kappa analysis according to the level of agreement classification at Hospital Universitário, Fortaleza – CE, Brazil, 2010

	Very similar to each other					Little similar to each other					
Analysis	n	%	95% CI	p	Kappa index	n	%	95% CI	p	Kappa index	Total
Observer 1	143	95.33				3	2.00				146
Observer 2	138	92.00	0.492-0.677	< 0.001	0.584	9	6.00	0.286-0.471	< 0.001	0.379	147
Observer 3	138	92.00				10	6.67				148

	Not similar to each other					
Analysis	n	%	95% CI	p	Kappa index	□
Observer 1	4	2.67				150
Observer 2	3	2.00				150
Observer 3	2	1.33	0.341-0.526	< 0.001	0.433	150
Overall Kappa	150	100	0.412-0.564	< 0.001	0.488	150

The observers performed, at different times, the inter-observer analysis of agreement and evaluated a situation in which they compared packaging and labels through pictures (n = 150 pairs), according to the following classification: very similar; little similar to each other; and no similarities. The interpretation of aggregation for the value of Kappa adopted the criteria of Landis and Koch[18], with a Kappa value = 1 being considered as perfect agreement and statistical significance set at $p < 0.05$. CI, confidence interval.

Discussion

Medications have a prominent place in health care and disease treatment. The alternative to achieve a cure is, for many individuals, the use of drugs[19,20].

Currently, more than 80% of patients who seek health services receive prescription drugs. There is a large number of prescription medications for hospitalized patients. Cassiani et al.[20] reported that patients received up to 17 medications per day during hospitalization, and nearly sixteen percent of the study participants were prescribed more than 10 types of drugs.

Our study describes the possibility of potential error related to medications with similar labeling, which constitutes an event or situation that could have resulted in accident, injury, or illness, but by sheer luck was not identified or nothing happened. According to Leape et al.[21], errors occur in all phases of the medication system: 39% of errors occur at the drug prescription, 12% at transcription, 11% at dispensing, and 38% during administration. Nurses and pharmacists intercept 86% of medication errors related to prescription, transcription, and dispensing errors, while only 2% are intercepted by the patients.

Our study was developed at the pharmacy of a university hospital and showed that the most "possibly similar" drugs were in the central pharmacy (43.33%, n = 65/150). It should be also noted that many of these drugs (51.33%, n = 77/150) were small-volume parenteral solutions (vials, closed-system bags), with higher risks for adverse events in drug administration.

Potential risk for medication errors exists in different sectors; however, the central pharmacy or dispensing sector is responsible for the quantity of drugs that are dispensed to the several inpatient units, which extends this risk to other phases of the medication system and is aggravated by the number of patients being cared for by the multidisciplinary team[22].

To ensure the prevention of medication errors, all health professionals should be involved in this system. Pharmacists are essential to ensure the rational and safe use of medications, as well as to warn about medication errors and how to prevent them. Most errors can be avoided if there is a distribution system that allows focusing on the process of preparing doses in the pharmacy service and more participation of the pharmacist by checking the prescription before dispensing it.

On the other hand, an effective interaction between the nursing service and the pharmacy service is critical, as many of the errors that occur during the dispensing process can be prevented at the time of drug administration by the nursing staff.

A multicenter study involving four hospitals in different regions of the country identified high rates of errors in the preparation and administration of medications. The authors suggest that to improve safety in drug delivery systems it is necessary to adopt a change in institutional culture in order to achieve concrete improvements[23].

Considering this scenario, it is interesting to discuss the events occurred in the hospital environment and to

Table 2 – Distribution of types of similarities stratified by printed data and design of drug labels analyzed in Hospital Universitário, Fortaleza – CE, Brazil, 2010

	Data printed on the medication labels								
Labeling	Same color of label or packaging			Same disposition of printed words			Same color of words		
Primary packaging	n = 84/150	%	p	n = 84/150	%	p	n = 84/150	%	p
	78	52		70	46.7		76	50.7	
Secondary packaging	n = 66/150	%	0.028	n = 66/150	%	0.001	n = 66/150	%	0.008
	66	44		66	44		66	44	

	Description of names, pronunciations and procurements								
Labeling	Similar names			Same pronunciation			Same manufacturer		
Primary packaging	n = 84/150	%	p	n = 84/150	%	p	n = 84/150	%	p
	26	17.3		27	18		49	32.7	
Secondary packaging	n = 66/150	%	0.183	n = 66/150	%	0.095	n = 66/150	%	0.001
	26	17.3		29	19.3		62	41.3	

	Characteristics of design					
Labeling	Same size			Same color		
Primary packaging	n = 84/150	%	p	n = 84/150	%	p
	72	48		78	52	
Secondary packaging	n = 66/150	%	0.531	n = 66/150	%	0.028
	56	37.3		66	44	

	Characteristics of design and information on the package label							
Dosage form	Plastic		Glass		Auto-adhesive labels		Printed	
Glass vials	n = 51/150	%	n = 51/150	%	n = 51/150	%	n = 51/150	%
	14	27.45	37	72.55	30	58.82	21	41.18

Labeling	High-alert medications (HAM)		
Primary packaging	n = 84/150	%	p
	39	26	
Secondary packaging	n = 66/150	%	0.05
	21	14	

A total of 150 pairs of pictures were analyzed, observing primary and secondary packaging concerning: data printed on drug labels; description of names, pronunciations and procurements; design features; and high-alert medications (HAM). * Pearson's chi-square test or Fisher's exact test with significance set at $p < 0.05$.

suggest changes in the medication circuit in hospitals, including: drug dispensing, administration, and storage, which are considered critical and are highly interconnected.

Thus, two approaches to human errors that occurred with identical drugs are described below: bottles of Vaseline and saline solution were identical and the names of the medications in the label were written in the same color, and were similar regarding the size, shape and color of the flip-top cover, causing the death of a child. The nurse aid told the police she was induced into error because the bottles were in the same cabinet (local). After the incident, the hospital responsible for the occurrence changed drug labeling procedures[24].

Another case of a potentially dangerous drug that caused cardiac arrest happened when potassium chloride was wrongly exchanged, due to the similarity with distilled water vials and for being stored in the same place, causing the death of a 3-year-old child due to accidental exchange of distilled water by chloride potassium. The error occurred while the nurse prepared an injection of sodium ampicillin and hydrocortisone to treat the patient for an infection (pneumonia). Because the drug formulation is in powder form, it needed to be diluted with distilled water or saline solution. The nursing assistant diluted the antibiotic with potassium chloride. Blood samples were collected from the child's body, and the test result was positive for high levels of potassium[25].

Most institutions blame the error on the individual, without taking into account the systemic causes and weaknesses in the medication system[26]. Thus, we emphasize the importance of guidelines or recommendations for improving patient safety in cooperation with the official organs of the public health system in Brazil, regulatory agencies, and public or private healthcare establishments, with the active participation of health professionals to facilitate the development of strategies to minimize these errors.

Considering this perspective, it is important to measure possible errors that may happen when you have drugs with similar packaging and labels, making it admissible to evaluate and ensure that the information abstracted from this study do not constitute only mere observations by the researcher. Thus, we used the Kappa index to evaluate and ensure that the product obtained by processing the digital images would be analyzed qualitatively and quantitatively, establishing the agreement among professionals in order to discuss the real risk of having drugs in the hospital environment with similar packaging and labels that could induce health professionals to medication errors.

When we analyzed the criterion "very similar to each other," the strength of inter-observer agreement was considered "satisfactory" (Kappa = 0.584) among the drugs evaluated. Whereas a perfect correlation is 1.00, there was a "regular" agreement index for the overall Kappa analysis (0.488).

Considering that there was an agreement among professionals, we analyzed several items that pointed to possible similarities between drug packaging and labeling, including: data printed on the labels of medications, description of names, pronunciations, procurements, design characteristics, and the potential hazards.

In the category of data printed on labels, our study tried to assess the influence of some variables that could be implicated in potential medication errors caused by the misunderstanding of drug names. Analyzing the description of names and pronunciations for primary and secondary packaging, no statistical significance was found for both similar names and same pronunciation, and lower values than those identified by Hoffman et al.[27] and Berman[28] were found, where similar packaging as well as names with orthographic or phonological similarity (looks like or sounds like) showed error values of 25 to 29%, as pharmacists and nurses can be led to unintentional drug exchanges resulting in damage to the patient and even death.

Still, according to Hoffman et al.[27], name misunderstanding is constantly associated with errors, although there is no apparent reason for that, as the ideal procedure is to read the labels at least three times before administering the medication. Even with regulations established by Anvisa with RDC N. 333 of 11/19/03[13], which established rules to prevent any similarities between name brands in the market, there are still similar brands that have not been reviewed by the regulatory agency, which grants registration of similar or even identical names to different medicinal substances.

The analysis of Berman's data[28] showed that similarities in drug names have often been ignored, generating names with spelling or phonological similarity that accounted for approximately 25% of medication errors, increasing the risk of adverse events to patients. Moreover, similar packaging and labeling of drugs accounted for 33% of medication errors, lower than the results found in our study.

Other aspects that were researched and discussed concerned the characteristics of the material and data printed on labels or packaging of glass vials, which accounted for 34% of all pharmaceutical presentations in the study, and among several examples of causes of medication errors for situations of extreme risk, we could mention the wrong preparation of injectable drugs. The glass vials were also found in the hospital environment more often than plastic ones and, in relation to identification, vials with self-adhesive labels predominated.

Taking into account the context of drug delivery systems in health institutions, the segment of self-adhesive labels on vials of injectable medicines is one of the most promising for drug differentiation (diversity of colors, graphics), capable of being printed. Additionally, they provide versatility to the production line and also to other processes outside the production line (e.g., hospitals) with well-structured logistics departments equipped with technology to capture and process data. This labeling system allows the possibility of including barcodes in vials, facilitating inventory control, identification, and assessment at the time of use and tracking of units, which is not observed in the traditional recording with the glass printing method, which mostly bear similarities among

the drugs marketed in Brazil. The concept of patient safety in hospitals is resulting in some progress, including the use of drugs with self-adhesive labels, which improves drug identification[29].

Another interesting aspect is that some of the drugs studied were the so-called high-alert medications or high-risk medications, which represented for the primary packaging a percentage of 26%. This was expected as the dosage form of glass vials accounted for 34% of all pharmaceutical presentations in the study. For the secondary packaging, a smaller percentage of 14% was found with p = 0.05, close to statistical significance. According to Rosa et al.[30], errors that occur with these drugs are not the most usual ones, but when they do occur, they have the highest severity and may lead to permanent injury or be fatal.

Still according to Rosa et al.[30], it was observed that over 90% of errors with HAM were concentrated on 11 drugs, namely heparin, fentanyl, midazolam, nalbuphine, pancuronium, dopamine, potassium chloride, tramadol, epinephrine, morphine, and pethidine. Corroborating our research, Figure 1 shows that of the 24 therapeutic classes analyzed, anesthetics were the second most commonly found (10.67%), followed by analgesics and antiinflammatory drugs. Electrolytes also had a considerable percentage (5.33%). As for antithrombotic agents, a percentage of 3.33% was found among the studied drugs.

When the research was related to the "type of medication and procurements" criterion, similar drugs were the most commonly found, what was expected for a teaching hospital that carries out procurement through a bidding process. The purchasing of medications for both primary and secondary packaging showed percentages near or equal to 40%, with statistical significance of p = 0.001 for the variable "same manufacturer", suggesting that the similarity in labels and packaging is also related to the production of different drugs by the same manufacturer, which generally uses the same artwork on the packaging for different products, without considering the peculiarities in drug labeling.

Conclusion

Our results indicate similarities related to drug labeling with potential for errors, especially in dispensing, storage, and administration if preventive measures are not adopted.

We emphasize the importance of guidelines and recommendations for improving patient safety with the collaboration of the Brazilian healthcare system, regulatory agencies, and public or private health establishments, as well as the active participation of health professionals, thus facilitating the development of strategies to minimize errors that may be harmful to patients.

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