Cogitare Enfermagem

ORIGINAL ARTICLE

EVALUATION OF DRUG PRESCRIPTIONS IN A HOSPITAL EMERGENCY DEPARTMENT

HIGHLIGHTS

1. No sample achieved 100% adherence to safety recommendations.
2. The item Bed number/letter showed 25.51% adherence.
3. The identification of drugs with similar names occurred in 0.23%.
4. The majority of potentially dangerous drugs showed adherence ≤ 79%.

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ABSTRACT

Objective: To evaluate the adherence of medical prescriptions to patient safety recommendations using the Medication Prescription Safety Checklist. **Method:** This is an observational, cross-sectional study carried out between May and June 2022, with 341 medical prescriptions for medicines in a hospital emergency room in the interior of Bahia - Brazil, whose data were analyzed through descriptive analysis. **Results:** 80% to 89% of the prescriptions adhered to the safety recommendations; the item with the highest adherence was identification of the date of the prescription, and the lowest adherence was having drugs with similar names identified in upper case or bold. Around 18.63% (n=514) of the drugs prescribed are on the list of potentially dangerous drugs for hospital use. **Conclusion:** The evaluation of medical prescriptions for medicines highlighted existing barriers in clinical practice, which makes it possible to develop more effective mechanisms to promote patient safety.

KEYWORDS: Drug Prescriptions; Patient Safety; Adverse Events; Hospital Emergency Department.

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INTRODUCTION

The high number of healthcare-related deaths was the precursor to developing international patient safety targets[1]. In Brazil, the National Patient Safety Program (PNSP) was established in 2013 to contribute to the qualification of care and establish safety actions and basic protocols for implementing these actions[2]. Among them is the Protocol for the safe prescription, use, and administration of medicines, which aims to promote safe practices in the use of medicines[3].

Since then, patient safety has been widely discussed in the scientific literature, highlighting the importance of protocols and routines for developing quality care and reducing patient risks. The hospital environment has been one of the most studied health services. However, it is still an unsafe environment for patients, with hospital emergencies being a sector where patients are exposed to risks for a long time[4-5].

According to the National Evaluation of Patient Safety Practices Report, carried out in hospital units with Intensive Care Units (ICUs), published in 2022, persistent obstacles exist to consolidating patient safety practices in these services. The report also pointed out that the Protocol on safety in the prescription, use, and administration of medicines had the third highest number of non-compliances among the hospitals studied[6].

Linked to this, Brazil had an increase in the mortality rate related to adverse drug events (ADEs), reaching an average of 12.1 deaths per one million inhabitants between 2008 and 2016[7]. Therefore, adverse events related to medicines are of significant relevance to health.

In this context, the medical professionals responsible for prescribing medicines stand out. Elements such as lack of experience, work overload, inadequate prescribing conditions, and lack of specific training and *feedback* when errors are identified are perceived as conditions that favor the occurrence of prescribing errors[8].

Thus, medical prescriptions for medicines (MPM) are perceived as objects of investigation in analyzing the occurrence of ADEs in different studies[8-11]. In the quest to mitigate risks, implementing information technology (IT) is an alternative for improving the health management process, including the medical prescription of medicines, helping to reduce the frequency of errors[12].

However, despite the growing use of IT in hospitals, MPMs remain susceptible to errors that can trigger serious patient adverse events. To assess the safety of the MPMs issued via computerized systems, a checklist was drawn up and validated - the Medication Prescription Safety Checklist (MPSC)[13], whose items assess the adherence of prescriptions to the recommendations contained in the Protocol for safety in the prescription, use and administration of medication, namely: the verification items; indication, calculation of doses and quantities of medication; use of vague expressions; dosage, dilution, speed, infusion time and route of administration[3].

Given this, this study aimed to evaluate the adherence of medical prescriptions to patient safety recommendations using the Medication Prescription Safety Checklist.

METHOD

A quantitative, observational, cross-sectional study was carried out in the municipality of Vitória da Conquista - BA - Brazil, in the emergency department of a general hospital, in the following sectors: female ward, male ward, and medication room. Data collection took

place from May to July 2022, and the study population consisted of the MPMs printed, prepared, and issued via the *SGH-SPdata System* at the study sites.

The inclusion criteria were: MPM issued via the *SGH-SPdata System* (the information system used at the study hospital), printed out up to 48 hours after the expiration date of the prescriptions (valid for 24 hours according to the hospital's protocol), in conditions where the items could be assessed, as exclusion criteria: prescriptions with damage (dirt, tears, etc.) that prevented evaluation of the components and drugs prescribed by a different route to the original prescription, i.e., added manually.

The sample was probabilistic and simply random. To calculate the sample number, we considered the number of medical prescriptions for medicines issued daily, valid for 24 hours, in the emergency sectors studied from March 2021 to March 2022, with a 95% confidence level, a 5% sampling error, and a minimum percentage of 0.64% obtained from a similar study by Carvalho and other authors (2016)[14]. Thus, the estimated sample size was 338 prescriptions.

The study looked at the items that made up the MPM, assessing whether they aligned with the safety recommendations according to the MPSC[13]. In addition, data was collected on the place of origin of the MPM, type of prescriber, and type of specialty of the MPM prescriber.

To assess adherence to patient safety recommendations, the MPSC[13] was used, with the author's prior authorization, structured on *Kobotoolbox.org*, consisting of two blocks of questions.

The first block, referring to the prescription identification, assesses nine items, Q1 to Q9: 1. patient's full name without abbreviations; 2. medical record number; 3. ward/apartment; 4. bed number/letter; 5. prescriber's full name; 6. Professional Council registration number; 7. prescriber's signature/password; 8. institution's full name; and 9. identification of the date of the prescription[13]. This first block was evaluated only once for each prescription.

The second block refers to the recommended medicines items and comprises thirteen questions, Q10 to Q22: 10. has abbreviations; 11. contains an abbreviated route of administration according to the institution's standardization; 12. is standardized in the Brazilian Common Denomination; 13. has drugs with similar names identified in upper case or bold; 14. uses expressions of non-metric measures (spoon, ampoule, vial); 15. pharmaceutical form accompanied by all the necessary information; 16. unit of measurement indicated, in the case of micrograms written in full; 17. uses a period instead of a comma (e.g., 0.5g instead of 500mg); 18. uses expressions such as "continuous use" or "without a comma" when prescribing doses. Uses a period instead of a comma when prescribing a dose; 18. uses a zero before a comma (e.g., 0.5g instead of 500mg); 19. uses expressions such as "continuous use" or "non-stop" related to the duration of treatment; 20. uses the expression "if necessary" with dosage, posology, maximum daily dose, and the condition determining use or interruptions in use; 21. contains information on diluents; and 22. defines the speed of infusion[13]. This second block was applied to each medicine contained in each prescription.

Each question had three answer options, and each nominal answer was given a numerical code. To determine the adherence score, the sum of the answers with code 1 (one) of the total valid items from 01 to 09 of the instrument was converted to a percentage of 100%, and for items 10 to 22, the proportion of the adherence percentage was calculated by adding code 1 (one) and dividing by the number of valid items[2].

Items 10, 14, 17, 18, and 19 were considered inverse items, i.e., non-adherence to these items received code 1 (one). To collect data on the item, *Do you have medicines with similar names identified in upper case or bold*, the list of medicines with similar spelling or sound was considered[13]. The checklist was used to obtain the percentage of adherence to

patient safety recommendations.

The prescriptions were grouped daily for three months, listed, and selected at random, reaching a total of 350 MPM, four of which were excluded because they were dirty and five because the printing was damaged, preventing the evaluation of the items in the prescriptions.

A total of 341 prescriptions and 2579 drugs were evaluated at the end.

The data was tabulated using the Microsoft Excel® program and presented in simple frequencies and percentages. The drugs prescribed were grouped according to the *Anatomical Therapeutic Chemical - ATC*, following the WHO[15], and classified whether or not they belonged to potentially dangerous drugs (PDD) for hospital use[16] for a better presentation of the frequencies and discussion of the data. Variables with an adherence percentage of 100% were considered safe, while adherence below 100% was considered unsafe, with insecurity inversely proportional to non-adherence to the recommendations.

The study is part of the research project entitled "Evaluation of patient safety in the prescription and administration of medication," which was submitted to and approved by the Human Research Ethics Committee of the Federal University of Bahia's Multidisciplinary Health Institute (CEP/UFBA-IMS), under opinion number 5.343.875.

RESULTS

The MPMs totaled 341, with 2579 medicines and an average of 7.56 medicines per prescription. The majority came from the medication room (67.74%, n=231), prescribed by a specialist medical professional (44.57%, n=152), with the predominant specialty being general surgery (33.55%, n=51), as shown in Table 1.

As for the drug groups prescribed, there were three with the highest frequencies: Nervous System and Cardiovascular System drugs (27.22%, n=702; 27.22%, n=702) and Gastrointestinal Tract and Metabolism drugs (23.77%, n= 613), as shown in Table 1.

Table 1 - Characterization of drug prescriptions (n=341) in an emergency department. Vitória da Conquista, BA, Brazil, 2022

Variables	n	%
Sector		
Medication room	231	67.74
Men's wing	51	14.96
Women's wing	59	17.30
Prescriber		
Diarist	97	28.45
On duty	92	26.98
Specialist	152	44.57

Specialist		
General Surgery	51	33.55
Cardiologist	18	11.84
Vascular Surgery	31	20.39
Neurosurgeon	13	8.55
Orthopedist	39	25.66
Drug group (according to ATC)		
Anti-infective	269	10.43
Gastrointestinal Tract and Metabolism	613	23.77
Blood and blood-forming organs	152	5.89
Cardiovascular System	702	27.22
Nervous System	702	27.22
Other*	141	5.47

*Other groups: Antineoplastics and immunomodulators, systemic hormones, excluding sex hormones and insulins, drugs used for skin conditions, organs of the sense, genitourinary system and sex hormones, musculoskeletal system, and respiratory system, presented in a single group due to their low frequency about the others.
Source: Authors (2022).

MPM's adherence to safety recommendations

Memberships of the MPMs were presented as a percentage by frequency interval. No sample was identified with 100% adherence to patient safety recommendations. Prescriptions for drugs with adherence between 80-89% had the highest frequency range with 50.73% (n=173) of the MPM, as shown in Table 2.

Concerning identifying drug prescriptions, the item with the highest adherence was "Identification of the date of the prescription" (99.98%, n=339). In contrast, the item with the lowest adherence was "Bed number/letter", which was present in only 25.5% (n=87) of the MPMs.

Regarding the items relating to the identification of the prescribed medication, the item with the lowest adherence was that of having medications with similar names identified in upper case or bold, which was present in only 0.23% (n=six) of the medications with other medications with similar names prescribed.

When it comes to the items related to the frequency of drug administration, there is a discrepancy in adherence to the recommendations, in which the item use expressions such as "continuous use" or "without stopping" related to the duration of treatment, considered an unsafe item, was adhered to by 19% (n=490), while the item: expression "if necessary" with dosage, posology, maximum daily dose and condition that determines use or interruptions in use, considered a safe item, was adhered to by only 13.88% (n=358).

There was low adherence to the items: contains information on diluents in 3.72% (n=96) and definition of infusion speed in 1.20% (n=31), according to Table 2.

Table 2 - Percentage of adherence, in total and by item, of medical prescriptions for medicines (n=341) and prescribed medicines (n=2759) to safety recommendations. Vitória da Conquista, BA, Brazil, 2022

Variables	n	%
Percentage of total adherence to prescriptions		
<79	128	37.54
80 – 89	173	50.73
90 – 99	40	11.73
100	0	0
First Block - Adherence to prescription identification items (%)		
1. Patient's full name without abbreviations	337	98.95
0. Medical record number	334	97.87
0. Ward/apartment	173	50.67
0. Bed number/letter	87	25.51
0. Prescriber's full name	334	97.94
0. Professional Council registration number	338	99.15
0. Prescriber's signature/password	335	98.26
0. Full name of institution	337	98.86
0. Identification of the prescription date	339	99.38
Second Block - Adherence to drug identification items		
0. It has abbreviations	149	5.78
0. Contains abbreviated route of administration as standardized by the institution	2530	98.18
0. Standardized in the Brazilian Common Denomination	2547	98.80
0. Has medicines with similar names identified in bold or upper case	06	0.23
0. Uses non-metric measurement expressions (spoon, ampoule, vial)	359	13.92
0. Pharmaceutical form with all the necessary information	2007	77.82
0. Unit of measurement indicated, in the case of micrograms written in full	2449	94.96
0. Uses a period instead of a comma when prescribing a dose	08	0.31
0. Use zero before the comma (e.g., 0.5g instead of 500mg);	93	3.61
0. Uses expressions such as "continuous use" or "non-stop" related to the duration of treatment	490	19.00
0. Expression "if necessary" with dosage, posology, maximum daily dose, and condition determining use or discontinuations of use	358	13.88
0. Contains information on diluents	96	3.72
0. Setting the infusion rate	31	1.20

Source: Authors (2022).

Adherence of drug groups to safety recommendations

About adherence to the safety recommendation items related to the drug groups, 24.77% (n=639) of the drugs had 100% adherence to the safety items. The drug groups Anti-infective, Blood and blood-forming organs, Gastrointestinal tract, and metabolism, Nervous system, and Others had the majority of drugs (60.97%, n=164; 34.44, n=52; 60.36%, n=370; 51.57%, n=362; 42.96%, n=61) with adherence of less than or equal to 79%, according to Table 3.

Still on the subject of drug groups, around 18.63% (n=513) of the drugs prescribed are on the list of PDDs for hospital use. Of these, drugs from the Nervous System group (47.76%, n=245) were prevalent, with Tramadol (35.02%, n=180) being the most prescribed drug. The majority of PDDs prescribed for hospital use had an adherence rate of less than or equal to 79% (67.84%, n=348), according to Table 3.

Table 3 - Percentage of total adherence to safety recommendations for prescribed medicines (n=2759) by drug group and potentially dangerous medicines for hospital use (n=513). Vitória da Conquista, BA, Brazil, 2022

Variables	n	%
Anti-infective		
<79	164	60.97
80 – 89	75	27.88
90 – 99	9	3.35
100	21	7.81
Total	269	100
Blood and blood-forming organs		
<79	52	34.44
80 – 89	41	27.15
90 – 99	08	5.30
100	50	33.11
Total	151	100
Cardiovascular system		
<79	99	14.10
80 – 89	257	36.61
90 – 99	35	4.99
100	311	44.30
Total	702	100
Nervous system		
<79	362	51.57
80 – 89	218	31.05
90 – 99	13	1.85

100	109	15.53
Total	702	100
Gastrointestinal tract and metabolism		
<79	370	60.36
80 – 89	109	17.78
90 – 99	15	2.45
100	119	19.41
Total	613	100
Other*		
<79	61	42.96
80 – 89	47	33.10
90 – 99	5	3.52
100	29	20.42
Total	142	100
Potentially Dangerous Medicines for Hospital Use		
<79	348	67.84
80 – 89	50	9.75
90 – 99	20	3.90
100	100	19.49
Total	513	100

*Other groups: *Antineoplastics and immunomodulators*, *systemic hormones, excluding sex hormones and insulins*, *drugs used for skin conditions*, *organs of the sense*, *genitourinary system and sex hormones*, *musculoskeletal system*, and *respiratory* system, presented in a single group due to their low frequency to the others.
Source: Authors (2022).

DISCUSSION

The absence of safe MPMs and the prescription of more than four drugs per patient can contribute to patients' vulnerability to adverse events in hospital emergencies. A study published in 2022, carried out in the metropolitan region of the state of Goiás in an Emergency Care Unit (ECU) with the administration of 751 doses of medication, found that 96.1% of errors were associated with a lack of information about the medication administered[17]. Another issue that can influence the occurrence of medication-related adverse events is polypharmacy, which contributes to hospitalizations due to adverse drug reactions, with high costs for health services[18].

When evaluating the prescription identification items, it was noted that the information system contributed to greater adherence to common data on the prescriptions, such as the name of the institution, date, and information on the prescribing doctor. Information technology resources have been highlighted as a support tool for prescribers to avoid prescription errors[10].

On the other hand, the fact that some information is not mandatory, such as identifying

where patients were admitted, coupled with the fact that this data is often unavailable or non-existent, as patients are accommodated on makeshift stretchers in hospital corridors, which is the reality at the study hospital, may contribute to non-adherence to the items. Low adherence to bed number/letter and ward/apartment was also found in a study carried out in the emergency department of a northeastern hospital in 2005, with 1,585 prescriptions, of which 71.6% did not have a bed box number19.

Despite being the first international target proposed by the WHO, problems with patient identification and the lack of an identification system have been reported in different studies. They are associated with preventable adverse events caused by changing the patient's name, wrongly administering medication, and providing care to other patients[17,20-22].

Identifying drugs with similar names, in upper case or bold, is one of the low-cost and easy-to-apply measures, with a list drawn up by the Institute for Safe Medication Practices[23]. However, despite the high adherence to the Brazilian Common Denomination (DCB), there is a gap in the information system so that, when prescribed, drugs with similar names are identified.

Implementing IT, such as automated prescription systems, is one of the general recommendations for safety in the use of drugs with similar spelling or sound. Still, other recommendations are necessary to guarantee this safety, such as the configuration of the system and the implementation of automation in dispensing and administering drugs[23].

However, it is worth noting that research into the *Tallmanletter*, the name given by the *Institute for Safe Medication Practices - United States of America (ISMP - USA)*, does not support using this strategy. According to a review of the evidence developed by the American institution, there is a lack of scientific evidence as to its efficacy. Despite this, the strategy remains recommended since different studies worldwide have shown the method's easy applicability, with fragility in the studies evaluating its efficacy[24].

The results relating to drug groups vary according to the research carried out, and this discrepancy may be linked to variations in pathologies, public, and place of study[11].

The average of 1.5 PDDs per MPM, the absence of MPMs with potentially dangerous drugs, and the lack of differentiation between drugs with similar names all point against the high vigilance required for this group of drugs. When analyzing PDD errors, it was found that omitting information about the drug was the most frequent[11].

In addition, the predominance of drugs from the Nervous System group among the PDDs prescribed converges as the most prevalent in incident reports, with adverse reactions, phlebitis, and medication errors being the incidents reported among the PDDs[25].

About doctors, the health professionals responsible for the prescription process, it should be noted that for these professionals, errors in drug prescriptions are associated with factors such as a poorly qualified workforce, ineffective specific knowledge, work overload, a disproportionate number of patients, and doctors, and the need for greater agility in drawing up prescriptions due to the high demand from patients[9].

They also pointed out that the automation of processes, especially those related to prescriptions, combined with the simplification of procedures and constant training of the entire team, are possible strategies for minimizing errors. Finally, they highlight the involvement of nursing and pharmacy professionals in interpreting prescriptions, which contributes to the perpetuation of prescription-related errors[9].

In this respect, pharmacists present themselves as barriers to prescription errors, and pharmaceutical interventions are important tools in ensuring patient safety[26]. Nursing professionals need to have prior knowledge of the drugs they administer. They are forbidden to administer drugs of which they are unaware of the indication, action, route of

administration, and possible risks, depending on their level of training[27], which is the last barrier to preventing errors from reaching the patient.

This study was limited to collecting information from prescriptions. The impact that non-adherence to safety recommendations in prescriptions has on the process of dispensing, preparing, and administering medicines and on the risk of developing adverse events was not assessed.

Safety in drug prescriptions is essential to reduce medication-related adverse events. Studies with a larger sample size and in larger hospital centers are needed to evaluate medical prescriptions in terms of adherence to safety recommendations and the quality of prescriptions to consolidate the results found.

CONCLUSION

The evaluation of medical prescriptions showed a lack of total adherence to patient safety recommendations. Patient identification was more insecure regarding the place of hospitalization, specifically the bed number/letter and ward/apartment. Concerning identifying the drug, there was low adherence to MPMs with similar names and insecurity in information about diluents and the definition of infusion speed. The lack of prescription safety relates to most drug groups, except for Cardiovascular System drugs.

Furthermore, from the results obtained, it can be inferred that using IT through a computerization system to prepare and issue MPMs does not guarantee that they comply with the recommendations of government agencies. In this respect, we highlight the need for computerization systems to be adapted to local realities, with support to guarantee safe prescribing, as well as monitoring by management to recognize existing risks and plan actions to help minimize them.

Furthermore, it is important to discuss the importance of patient safety in the MPM and interprofessional work from professional training to assess and detect possible non-conformities in medical prescription medicines.

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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - **Costa LC, Oliveira AP de F, Pires P da S**. Drafting the work or revising it critically for important intellectual content - **Costa LC, Oliveira AP de F, Pires P da S, Cunha JXP da, Nunes ECDA, Jesus JS de.** Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **Costa LC, Oliveira AP de F**. All authors approved the final version of the text.

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