

Medication reconciliation at patient admission to an emergency care unit in northern Mato Grosso, Brazil

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Abstract. Medication reconciliation is a crucial process for patient safety, particularly during admission to emergency care units. This study aimed to describe and quantify medication discrepancies identified during medication reconciliation among patients admitted to an Emergency Care Unit in Sinop, Mato Grosso, Brazil. We conducted a prospective observational study with a quantitative design involving a convenience sample of 60 patients admitted to the unit between 31 January and 10 April 2025. Medication discrepancies were identified in 41.7% of patients. Of the 58 discrepancies identified, 40% (n = 23) were intentional and 60% (n = 35) were unintentional. Medication omission was the most common type of unintentional discrepancy, accounting for 66% (n = 23) of cases. These findings highlight the importance of medication reconciliation in minimizing errors and ensuring safe and continuous medication therapy in emergency care settings.

Keywords: medication reconciliation; patient safety; medication errors

Introduction

Medication reconciliation is the process of compiling a comprehensive list of a patient's medications and should be performed at hospital admission and discharge, whenever a new medication is prescribed, during transfers between units, and during transitions between different levels of care (MS, 2014; CFF, 2016). This method is an essential measure to ensure patient safety during medication therapy.

The concept of medication safety has evolved over time. Historically, studies on medication safety focused on the investigation of adverse drug reactions. However, new methods on monitoring medication use have shown that incidents may occur not only because of the intrinsic risks of a product, but also because of failures during the medication-use process, resulting in inappropriate use that may place patient safety at risk (Rissato, Romano-Lieber, Lieber, 2008).

Studies on medication-related problems have received increasing attention worldwide from healthcare professionals, institutions, and health authorities, as these problems contribute to increased morbidity and longer hospital stays, add costs to healthcare systems, and affect the quality of patient care (Kohn et al., 2000; Freitas et al., 2017).

In Brazil, through Ordinance No. 529 of 1 April 2013, the Ministry of Health established the National Patient Safety Program (Programa Nacional de Segurança do Paciente - PNSP), which aims to improve healthcare in all healthcare facilities throughout the country by encouraging the adoption of practices that promote safer and more effective care throughout health services (Brasil, 2013).

In 2017, the World Health Organization estimated that the annual cost associated with medication errors was US\$42 billion, corresponding to approximately 1% of global healthcare spending (WHO, 2017). In the same year, the WHO launched its third Global Patient Safety Challenge, Medication Without Harm, which aimed to reduce avoidable medication-related problems by 50% within five years. The objective was to improve healthcare systems and make them safer throughout all stages medication-use, including prescribing, dispensing, preparation, administration, and monitoring. It was therefore necessary to identify the stages associated with a greater risk to patient safety and to develop tools and error-prevention strategies to make healthcare systems safer and more effective. The proposed actions included:

1. Developing practical measures covering all stages of the medication-use process, including prescribing,

dispensing, preparation, administration, and monitoring.

2. Assessing and identifying the stages of the medication-use process in which preventable harm associated with medication errors occurs.
3. Developing standard operating procedures (SOPs), documents, and guidelines, and adopting technologies and tools that promote safer medication use and reduce preventable harm.
4. Engaging patients, healthcare professionals, partners, and the pharmaceutical industry in actively seeking solutions.
5. Empowering patients and their families to take an active role in decisions related to medication use—questioning healthcare professionals about prescribed medications and procedures—thereby acting as an additional barrier against medication errors.

In hospitals, medication reconciliation contributes to patient safety by preventing medication errors. The activity involves collecting information on all medications regularly used by the patient. This first step aims to obtain the most accurate medication history, which is then compared with the prescribed medications to assess any discrepancies, classified as intentional or unintentional. This process may avoid errors such as therapeutic duplication, omission of a regularly used medication, and incorrect dose, frequency, administration time, or route. This assessment may also be performed during transfers between hospital units, at hospital discharge, or during transitions between different levels of care. Medication reconciliation aims to ensure the accurate and consistent communication of information about a patient's medications during transitions of care. It involves patients and numerous healthcare professionals throughout the continuity of care (RDC 585, 2013; WHO, 2014; Costa et al., 2021).

The implementation of this practice has been a major challenge for hospitals as it requires close interaction among the multidisciplinary team involved in the medication-use process, especially physicians, nurses, and pharmacists (Silvestre and Lyra Junior, 2018). Few studies have evaluated medication reconciliation in Brazilian hospitals (Silva et al., 2022).

This study aimed to perform medication reconciliation in an Emergency Care Unit in a city in the countryside of Mato Grosso.

Material and methods

Study design and setting

This was a prospective, exploratory observational study involving 60 patients admitted to an Emergency Care Unit located in northern Mato Grosso. The unit is classified as a level 2 facility and has 79 active beds, serving as an important referral center for a population of more than 223,000 inhabitants (IBGE, 2025). It provides care to approximately 14,000 patients per month. The pharmacy department has 14 staff members: 10 pharmacy assistants and four pharmacists who work

12-hour shifts followed by 36 hours off, in addition to a pharmacist in charge who works eight hours per day from Monday to Friday. The department remains open 24 hours a day.

Data collection

The analyses were based on the printed prescription available at the time of data collection, which could be either prescription prepared in the inpatient department or the prescription from the initial medical care. The data collection form was developed for this study based on previously published researches. It included questions on demographic characteristics, such as sex and age; clinical data, including the diagnostic hypothesis and comorbidities; and patients' pharmacotherapeutic information. During medication reconciliation, the medications regularly used by the patients were compared to the prescribed medications. Differences were considered discrepancies and classified as intentional or unintentional. Intentional discrepancies occurred when there was a clinical justification, such as compliance with institutional protocols, substitution with medications available in the hospital formulary, or a change required by the patient's clinical condition. Unintentional discrepancies were considered medication errors and included omission of regularly used medications, incorrect doses, inadequate dosage regimens, or therapeutic duplication (Otero-Lopez et al., 2008; Alanazi et al., 2022).

The study included hospitalized patients aged ≥ 18 who had at least one previous comorbidity and a prescribed medication therapy. Medication reconciliation was performed within a maximum of 48 hours after admission to the emergency care unit on weekdays; and within 72 hours for admissions on weekends or holidays, using a previously developed form for standardized data collection (Otero-Lopez et al., 2008). Patients under observation in the emergency department, pediatric patients, unconscious, sedated, and/or intubated patients, and patients in isolation were excluded.

Ethical considerations

This study was approved by the Research Ethics Committee of the Federal University of Mato Grosso, Sinop Campus, under CAAE No. 77146623.7.0000.8097 and approval No. 6,776,451.

The data were organized in electronic spreadsheets and submitted to descriptive statistical analysis using Microsoft Office Excel®. Means and absolute and relative frequencies were calculated to describe the profile of the identified discrepancies.

Results and discussion

The convenience sample consisted of 60 patients who underwent medication reconciliation during hospitalization between 31 January and 10 April 2025. Of these, 30 patients (50%) were female. Age ranged from 34 to 98 years, and patients aged 70 years or older were the predominant age group, representing 50% of the sample, as detailed in Table 1.

Table 1 - Clinical and demographic profile of the study population, Sinop, Mato Grosso, April 2025.

Characteristics	Study population	
	n=60	(%)
Sex		
Female	30	50
Male	30	50
Age		
30-49	11	18.3
50-59	5	8.3
60-69	14	23.3
>= 70	30	50.0
Number of comorbidities		
1	16	26.7
2	28	46.6
3 or more	16	26.7
Underlying disease		
Cardiovascular diseases	56	93.3
Type 2 diabetes mellitus	29	48.3
Central nervous system diseases	7	11.7
Respiratory system diseases	6	10.0
Cancers	4	6.67
Hypothyroidism	3	5.00
Benign prostatic hyperplasia	3	5.00
Renal system diseases	2	3.33

Source: Data collected at the Emergency Care Unit in Sinop, Mato Grosso, 2025.

The data in Table 1 are similar to those observed in other Brazilian studies (Carneiro et al., 2023; Silva, Alves-Zarpelon and Laureano, 2021; Lombardi et al., 2016), showing a higher incidence of hospitalization among the elderly due to decompensation of underlying diseases.

Regarding comorbidities, 44 patients (73.3%) had two or more pre-existing clinical conditions. In the study from Silva, Alves-Zarpelon and Laureano (2021), 50 patients admitted to hospital units were analyzed and the researches identified 50% of the cases with two or more pre-existing clinical condition. Despite the difference in the results, both studies showed a high prevalence of multimorbidity, reinforcing the complexity of these patients' clinical profile and the need for individualized and coordinated care in the hospital setting. Cardiovascular diseases were the most frequent condition, particularly systemic arterial hypertension, which affected 88.3% of the patients. Type 2 diabetes mellitus was identified in 48.3% of the patients. These values were also higher than those found by Mendes et al. (2016), who reported a prevalence of 51.8% for cardiovascular diseases, and by Silva, Alves-Zarpelon and Laureano (2021), who reported rates of 41% for systemic arterial hypertension and 30.8% for diabetes mellitus. This difference may be related to the profile of the population treated at the Emergency Care Unit in Sinop. Because these chronic conditions require continuous treatment with multiple medications, they create considerable challenges for medication reconciliation, especially at hospital admission.

The reasons for hospitalization varied, with cardiovascular, infectious, metabolic, and traumatic conditions being the most frequent (Table 2).

Regarding regular medication use, the number of medications taken daily by the patients ranged from 1 to 15, with an average of four medications per day. Among the participants, 37 patients (58%) used between one and four medications daily, while 25 (39%) used between five and 15 medications per day. These data indicate a relevant level of polypharmacy. A total of 260 regularly used medications were identified. Of these, 61% (n = 158) were included in the unit formulary and were available at the Emergency Care Unit. It is worth noting that, during data collection, patients did not always accurately report all their medical conditions or the medications they take, either because of forgetfulness or lack of knowledge. In addition to prescribed medications, many patients used natural products, such as herbal teas and dietary supplements, which were often not reported, as also observed by Frizon et al. (2014).

Among the 60 patients, 25 (41.7%) had at least one medication discrepancy. A total of 58 discrepancies were identified, of which 40% (n = 23) were classified as intentional and 60% (n = 35) as unintentional, as shown in Table 3. Among the unintentional discrepancies, medication omission was the most prevalent classification.

An analysis of the pharmacological classification of the medications involved in discrepancies revealed that, cardiovascular medications were the most frequently, accounting for 48% (n = 28) of the identified discrepancies. Antidiabetic medications were the second most frequent group and represented 26% (n = 15) of all discrepancies (Table 4).

Table 2 - Main reasons for hospitalization and respective ICD-10 codes, Sinop, Mato Grosso, 2025.

Reasons for hospitalization/ ICD-10re	n
Decompensated heart failure / I50	7
Venous embolism and thrombosis / I82.9	6
Acute myocardial infarction / I21.9	5
Diabetic foot associated with insulin-dependent diabetes mellitus/ E10.8	4
Disorders of the skin and subcutaneous tissue, unspecified / L98.9	3
Dengue / A90	3
Fracture of unspecified body region / T14.2	3
Pneumonia, unspecified / J18.9	2
Urinary tract infection - pyelonephritis / N39.0	2
Fracture of skull or facial bones, unspecified part / S02.9	2
Acute upper respiratory infection, unspecified / J06.9	2
Hypoglycemia, unspecified / E16.2	2
Dyspnea / R06.0	2
Diabetes mellitus, unspecified, without complications / E14.9	2
Cholelithiasis / K80	2
Stroke, unspecified / I64	2
Cholecystitis / K81	1
Angina pectoris (chest pain) / I20	1
Fracture of lower leg, unspecified part / S82.9	1
Fracture of other and unspecified parts of wrist and hand / S62.8	1
Gastrointestinal hemorrhage / K92.2	1
Attention to gastrostomy / Z43.1	1
Renal colic / N23	1
Hypo-osmolality and hyponatremia / E87.1	1
Erysipelas/diabetic foot / A46 and E11.5	1
Head injury / S06	1
Bell's palsy / G51.0	1
Total	60

Source: Research data.

Table 3 - Types of medication discrepancies identified at the Emergency Care Unit in Sinop, Mato Grosso, 2025.

<i>Intentional discrepancies</i>	<i>n= 23</i>
Medical decision based on the patient's condition	21 (91%)
Substitution with formulary medications	2 (9%)
<i>Unintentional discrepancies</i>	<i>n= 35</i>
Omission	23 (66%)
Therapeutic duplication	9 (26%)
Incorrect dose	3 (8%)
Timing and duration	-
Frequency	-

Source: Research data, 2025.

Table 4 - Medications involved in discrepancies according to ATC classification at the Emergency Care Unit in Sinop, Mato Grosso, 2025.

ATC classification of medications	Discrepancies	
	Unintentional	Intentional
A - Alimentary tract and metabolism	4 (11%)	11 (48%)
B - Blood and blood-forming organs	3 (9%)	3 (13%)
C - Cardiovascular system	21 (60%)	7 (30%)
G - Genitourinary system and sex hormones	1 (3%)	0
H - Systemic hormonal preparations	1 (3%)	2 (9%)
N - Nervous system	4 (11%)	0
R - Respiratory system	1 (3%)	0
Total	35 (100%)	23 (100%)

Source: Research data, 2025. **Note:** ATC: Anatomical Therapeutic Chemical Classification System.

In this context, it is noteworthy that patients who are familiar with the names, dosages, purposes, and correct methods of administration of their medications are in a better position to help prevent

medication errors. Therefore, healthcare professionals should not only provide guidance on safe medication use but also promote the active involvement of patients in the care process, aiming

to improve treatment safety and effectiveness (Anacleto et al., 2010).

Another relevant aspect is that hospitalization represents a critical moment in which lack of information on medication therapy may lead to treatment interruptions and therapeutic inadequacies and may interfere in the identification of medication-related problems, increasing risks to the patient. In addition, insufficient communication between healthcare professionals and patients during medication history collection contributes significantly to prescribing errors, which are frequent at hospital admission (Frizon et al., 2014).

A total of 58 discrepancies were identified, of which 35 were classified as unintentional and 23 as intentional. Among the unintentional discrepancies, omission of a regularly used medication was the most prevalent type, followed by therapeutic duplication and changes in the prescribed dose. Regarding the pharmacological classification of the medications involved, cardiovascular medications were the most prevalent, representing 48% of the identified discrepancies, followed by antidiabetic medications, with 26%. These findings are consistent with data from the literature (Barbosa, Szpak and Chrispim, 2021; Candido et al., 2023; Carneiro et al., 2023; Dorneles et al., 2020; Lombardi et al., 2016).

In a study conducted at a university hospital in Rio de Janeiro, Frizon et al. (2014) found that 67.2% of unintentional discrepancies were related to medication omission, and 20% of these were later resolved after pharmaceutical intervention. Similarly, Deep et al. (2021) observed at a tertiary metropolitan hospital in Australia that 72% of patients had discrepancies, with a median of three per patient, and omission accounted for 60.9% of the cases. The medications most frequently involved belonged to the alimentary tract and metabolism and cardiovascular system groups, which together accounted for almost 60% of the total.

Studies also indicate that these failures may occur in up to 70% of cases and are more common in emergency admissions, nighttime admissions, weekends, and among patients with multiple prescriptions (Frizon et al., 2014). When they involve medications essential for the control of chronic diseases, such as antidiabetic and cardiovascular medications, they lead to clinical adverse events of moderate to high severity (Deep et al., 2021).

The results of the present study corroborate the findings of Mendes et al. (2016), the first Brazilian randomized clinical trial on this subject. Both studies identified a high prevalence of chronic diseases, especially cardiovascular and endocrine disorders, and a considerable number of medications taken prior to hospitalization. While the present study identified an average of four medications per patient, Mendes et al. (2016) reported an average of six, reinforcing the association between polypharmacy, advanced age, and a higher risk of failures. In both studies, omission was the most frequent type and was

observed in 64% of cases in the study by Mendes et al. (2016).

The high incidence of omissions may be related to the absence of formal medication reconciliation protocols, which may lead patients or their caregivers to assume responsibility for administering regularly used medications brought from home. This may compromise treatment continuity, especially when the medication is not presented to the healthcare team. In addition, incomplete and often inaccurate collection of medication histories contributes to the recurrence of these failures, as reported by Lombardi et al. (2016). These aspects show the need to adopt systematic strategies involving multidisciplinary teams and well-defined protocols. At hospital admission, the lack of complete information on previous medication use may result in treatment interruptions or inadequacies. Poor communication among patients, family members, and healthcare professionals, especially in emergency care units, aggravates this problem (Oliveira et al., 2018). Many of the analyzed medical records lacked essential data, such as a list of regularly used medications, doses, administration schedules, and allergy history, which directly compromises patient safety and increases the risk of adverse events.

Of the 60 medical records analyzed, 13% ($n = 8$) did not contain any information on regularly used medications, 60% ($n = 37$) contained complete records, and 27% ($n = 17$) contained inconsistencies, such as discrepancies, incorrect medication names, or records of medications not used by the patient. Oliveira et al. (2018) identified a complete absence of records in more than 80% of cases. These data reinforce the need to establish medication reconciliation as a systematic practice at hospital admission to ensure the continuity and safety of medication therapy.

Studies such as that of Mendes et al. (2016) show that medication reconciliation requires considerable time and multiple data sources to be carried out effectively. In that study, pharmacists consulted an average of two data sources per patient to collect the medication history, with an average intervention time of 40 minutes. In clinical practice, the required time may vary significantly according to the heterogeneity of the population, including age, number of medications used, and number of comorbidities, factors also observed in our sample.

The use of standardized tools, such as reconciliation lists, is essential to ensure accuracy when collecting the medication history and safety during transitions of care. To ensure their effectiveness, it is necessary to invest in the continuous training of the healthcare team and to promote interdisciplinary work. In addition, complete documentation in medical records at both admission and discharge, together with a joint review by the healthcare team and the patient, is essential to ensure the continuity and quality of medication therapy (Oliveira et al., 2018).

Furthermore, structural limitations, such as the shortage of trained clinical pharmacists and the difficulties in performing medication reconciliation within the first 48 hours of hospitalization, are also obstacles reported in several healthcare services, including the Emergency Care Unit in Sinop. These barriers show the need for investment in human resources and infrastructure, as well as the need to strengthen and consolidate the role of clinical pharmacists within multidisciplinary teams (Silva, Alves-Zarpelon and Laureano, 2021; De Sousa, Tofani and Martins, 2022).

However, this study had some limitations that should be taken into account. One limitation was the difficulty in characterizing and defining discrepancies because of the lack of standardization in the terminology used in the literature. Similar definitions are frequently used, but this makes comparisons between studies and the standardization of clinical practices difficult (Da Silva, Alves-Zarpelon and Laureano, 2021).

Although the present study identified and quantified medication discrepancies at hospital admission, it was not possible to measure their direct clinical effects, such as longer hospital stays, the need for new therapeutic interventions, hospital readmissions, or the occurrence of preventable adverse events. This limitation prevents an assessment of the actual effect of medication reconciliation on patient morbidity and mortality.

In addition, no formal records were produced regarding the resolution of the identified unintentional discrepancies. This limits the analysis of clinical outcomes and makes it difficult to assess the effect of possible pharmaceutical interventions. Future studies should go beyond descriptive analysis and include measurable clinical indicators to assess the effects of these interventions on treatment outcomes, such as reduced complications and hospital costs and improved medication adherence.

Another relevant limitation concerns the reliability of the information obtained at hospital admission. Many participants were elderly, and some had low health literacy, which combined with the complexity of their medication regimens, may have compromised the accuracy of data regarding pre-admission medication. Some information may have been inaccurate, leading to underestimation or overestimation of the actual number of discrepancies. The use of multiple sources, such as information from community pharmacies, health information systems, and previous prescriptions, could reduce recall bias and improve the accuracy of medication reconciliation.

From a structural perspective, medication reconciliation remains challenging in many healthcare services, mainly because of the lack of standardized processes, the absence of integrated technological tools across different levels of care, and the shortage of specialized human resources. The development and implementation of a validated institutional protocol, with standardized forms such

as a medication reconciliation checklist, training of the multidisciplinary team to accurately document medication histories, investment in electronic medical records integrated with pharmacy systems, and periodic internal audits are essential strategies to ensure the quality and accuracy of records.

In many Brazilian hospitals, especially small and medium-sized hospitals, the number of pharmacists is limited, and their activities are mainly focused on service management and inventory control. The absence of a structured clinical pharmacy department limits the effective participation of pharmacists in healthcare teams and compromises the clinical monitoring of patients, even though pharmacists are the professionals best suited to conduct strategies related to the safe and rational use of medications (De Sousa, Tofani and Martins, 2022). The inclusion of pharmacy residents, supervised interns, and pharmacy students in an expanded multidisciplinary team could help address the shortage of professionals and make medication reconciliation feasible.

These limitations expose weaknesses that extend beyond the unit investigated and reflect systemic barriers to implementing medication reconciliation as an established practice in the healthcare system. The lack of specific public policies, continuous professional training, and recognition of the clinical role of pharmacists contributes to persistent failures in care, increasing the risk of preventable adverse events and compromising patient safety.

Thus, institutional and political efforts are needed to promote the systematic implementation of medication reconciliation in healthcare services. Investments in continuing education, multidisciplinary integration, technological infrastructure, and recognition of clinical pharmacists are essential to strengthen this practice and ensure safe, effective, and patient-centered care.

Conclusion

The occurrence of unintentional discrepancies, particularly medication omissions and especially those involving cardiovascular medications, highlights the weakness of transitions-of-care processes and the need to improve communication among healthcare professionals, patients, and family members.

While an effective medication reconciliation strategy can enhance therapeutic safety, its success relies on structural factors, such as well-defined protocols, qualified professionals, integration among healthcare professionals, and systematic documentation of interventions.

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