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Evaluation of medical reconciliation during hospital admission of renais patients

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A B S T R A C T

To assess the medication reconciliation process during admission to the nephrology infirmary of the Hospital das Clínicas of the Federal University of Pernambuco. Methodology: Retrospective and descriptive quantitative study, made possible through the analysis of forms applied by clinical pharmacists during their work routine. The drugs most involved in discrepancies were identified, their association with polypharmacy and service performance analysis. The collected data are presented as frequency, average and standard deviation. The statistical analysis was performed using SPSS.V.21.0, the Qui square test was used to analyze the association between the dichotomous variables and the level of rejection of the null hypothesis was fixed at 1% (p< 0.01). Results: Foram analyzed 250 forms. 63.2% presented discrepancies, while 32.3% were unintentional discrepancies. 1,384 medications were used by patients before hospitalization, among which 24.1% had some type of discrepancy. Furosemide and Metformin are frequently associated with intentional discrepancies; Anlodipine for undocumented intentional discrepancy and vitamin D/Calcitriol for unintentional discrepancy. An association was verified between polypharmacy and the occurrence of discrepancies (p<0.01). Conclusion: A low prevalence of unintentional discrepancies was identified, therefore greater attention should be given to drugs that require laboratory monitoring. Furthermore, a statistical association between polypharmacy and the occurrence of discrepancies was observed. The reconciliations are mostly carried out in a maximum interval of 48 hours and present a variable monthly coverage.

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R E S U M O

Avaliar o processo de reconciliação medicamentosa durante a admissão na enfermaria de nefrologia do Hospital das Clínicas da Universidade Federal de Pernambuco. Metodologia: Estudo de caráter quantitativo retrospectivo e descritivo, viabilizado mediante a análise de formulários aplicados pelo farmacêutico clínico durante sua rotina de trabalho. Foram identificados os medicamentos mais envolvidos em discrepâncias, a associação destas com polifarmácia e a análise de desempenho do serviço. Os dados coletados foram apresentados como frequência, média e desvio padrão. A análise estatística foi realizada utilizando SPSS.V.21.0, o teste do Qui quadrado foi utilizado para análise de associação entre as variáveis dicotômicas e o nível de rejeição da hipótese de nulidade foi fixado em 1% (p< 0,01). Resultados: Foram analisados 250 formulários. 63,2% apresentaram discrepâncias, porém 32,3% eram discrepâncias não intencionais. 1384 medicamentos foram utilizados pelos pacientes antes da internação, dentre os quais 24,1% possuíam algum tipo de discrepância. Furosemida e Metformina foram frequentemente associados a discrepâncias intencionais; Anlodipino à discrepância intencional não documentada e vitamina D/Calcitriol às discrepâncias não intencionais. Foi verificada associação entre a polifarmácia e a ocorrência de discrepâncias (p<0,01). Conclusão: Foi identificada uma baixa prevalência de discrepâncias não intencionais, porém uma maior atenção deve ser dada aos medicamentos que necessitam de monitoramento laboratorial. Além disso, a associação estatística entre polifarmácia e ocorrência de discrepâncias foi observada. As reconciliações foram majoritariamente realizadas no intervalo máximo de 48 horas e apresentaram uma cobertura mensal variável.

Palavras-Chave:
Segurança do paciente, erros de medicação, nefrologia.

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Introduction

Errors in the use of medications are among the most common causes of in-hospital morbidity and mortality. Faced with this fact, the World Health Organization (WHO) in 2017 announced its third global patient safety challenge, which aims to reduce drug-related iatrogenic harm globally by 50% in five years, with care transition being one of the three areas action priorities. Unintentional medication discrepancies (e.g., omissions, duplications, and dosing errors) can occur in care transitions and, if not identified and resolved, can place the patient at risk for medication-related harm, negatively impacting quality and safety of the patient (Alqenae *et al.*, 2020).

One way to minimize medication discrepancies is through medication reconciliation (Schnipper *et al.*, 2018), which comprises the process of creating an accurate list of all medications the patient is taking - including the name of the medication, dosage, frequency and route - and compare this list with admission, transfer and/or discharge prescriptions, with the aim of providing the correct medications to the patient at all transition points within the hospital (Institute for Healthcare Improvement, 2021). Van der Gaag and colleagues (2017) showed that medication reconciliation in a clinic decreased unintentional discrepancies. Wilson et al (2017) provided evidence that reconciliation increased patient safety and potentially prevented adverse events. Additionally, implementation of reconciliation has resulted in greater safety when resolving medication discrepancies in patients with advanced chronic kidney disease (Phillips *et al.*, 2017).

Nephrology patients are of special interest to studies related to medication reconciliation, as they tend to take polypharmacy (Ebbens *et al.*, 2019), as they generally have other comorbidities associated with the kidney problem and consult different health professionals (Wilson *et al.*, 2017; Phillips *et al.*, 2017). These frequent visits to different medical specialties can lead to more medication errors during the transition of care, because with each new contact, medication reconciliation can fail. Furthermore, in these patients, the stage of kidney disease varies over time and therefore dosage adjustments are often necessary (Ebbens *et al.*, 2019).

Agency for Healthcare Research and Quality's (ARQH) points out that the introduction of medication reconciliation continues to be an obstacle in many hospitals, with significant variation in the quality of medication reconciliation (The Joint Commission, 2016). The National Patient Safety Program (PNSP), published by the Ministry of Health (MS) in 2013, when indicating medication reconciliation as one of the therapy management strategies, did not outline actions and instruments necessary for its implementation (Graça *et al.*, 2018). According to Thomas *et al.* (2018), data collection instruments are fundamental tools for gathering information from individuals who portray a certain people. Likewise, they must be clear and functional, in order to respond to goals of the study. The design of an instrument is

an extremely important aspect to ensure that elements are gathered accurately, in addition to that the data is understandable and generalizable.

Recent regulations require recording the performance of medication reconciliation, without taking into account the quality of the process, which could worsen the safety of medication use, as it would pressure professionals to document below the standard that is required, which has the potential for inhibit the correction of subsequent errors in prescriptions. This circumstance reflects the complexity and need for resources for effective interventions during medication reconciliation. Therefore, there is no simple resolution, as these need to be carefully combined with the organization's strengths, workflows and goals based on institutional priorities (Pevnick *et al.*, 2016).

The evaluation of medication records in medical records is necessary so that strategies can be designed based on this opinion and thus improvements can be made in the medication reconciliation process. Thus, given the lack of research in the clinical pharmacy sector of the *Hospital das Clínicas* of the Federal University of Pernambuco (HC-UFPE) regarding medication reconciliation, the study aims to evaluate the medication reconciliation process during admission to the nephrology ward of this hospital.

Methodology

Research design

This is a retrospective, descriptive, quantitative study. Made possible through analysis of forms applied by the clinical pharmacist during medication reconciliation in the nephrology ward at HC-UFPE. Clinical pharmacists carry out medication reconciliations with hospitalized patients on a daily basis, a routine already consolidated in the service. This process consists of an interview guided by the medication reconciliation form, then the information collected is compared with the current prescription and categorized into four possible categories: intentional discrepancy (ID) when the doctor chooses to add, change or discontinue a medication and clearly documents; undocumented intentional discrepancy (UID) if the physician chooses to add, change, or discontinue a medication, but this choice was not clearly documented; unintentional discrepancy (UD) if the doctor unintentionally adds, changes or omits a medication that the patient used before admission and no discrepancy (ND) when the doctor maintains the prescription for home use. This process is recorded in the patient's medical record and the completed form is filed in the pharmacy department.

Participants Sample

Forms applied in the HC-UFPE nephrology ward during the medication reconciliation service carried out during the research analysis period were used (January/2021 to

January/2022). The inclusion criteria were the forms filled out after interviews with adult patients over 18 years old admitted to the nephrology ward at HC-UFPE.

Participants Recruitment

As the study analyzed a database from the clinical pharmacy sector, there was no direct participation of the subjects involved. Only the information provided during the application of the medication reconciliation form was used, an activity that is already part of the sector's clinical routine.

Data collection Instruments

The instrument used for collection was the form applied during the medication reconciliation service, which is based on an instrument developed by Mendes (2016) during his master's thesis, with potential sources of information: the patient, medical records, medical prescriptions, the presence of medicines brought from home by the patient, family members or caregiver. The data obtained resulted in a list containing all medications used by the patient - including the name of the medication, dosage, frequency and route. Subsequently, this list was compared with the admission prescriptions. From this comparison, the clinical pharmacist identified whether there was a discrepancy between the two lists and classified it according to its intentionality and documentation, as defined in current literature (Dyer *et al.*, 2022; Ebbens, 2021; Härkänen *et al.*, 2018).

Data collection and Analysis Procedures

Based on the classification carried out by the clinical pharmacist according to intentionality and documentation, it was possible to tabulate and quantify such information in Excel.

Secondary variables were obtained through the evaluation of medication history by surveying medications most involved in discrepancies and the association between polypharmacy and the occurrence of identified discrepancies.

It was also possible to examine service performance by checking the completeness of requirements that needed to be completed on the reconciliation form (source of information, admission, date of reconciliation, name, sex, age, date of birth, weight, bed, medical record, clinic , medications, dose, frequency, type of discrepancy, whether the patient brought the medication and whether the discrepancy was resolved); the percentage coverage of the service according to the total number of hospitalized patients, this value obtained through the Mastertools operating system and the time elapsed between admission and medication reconciliation.

Collected data were analyzed quantitatively, organized in spreadsheets and presented as frequency, mean and standard deviation using Graphs and Tables created in the Microsoft Excel® program (2019 version). Statistical analysis was performed using the Statistical Package for Social Science V 21.0 [SPSS Inc, Chicago, IL, USA]. The Chi-square test was used to analyze the association between dichotomous variables. The level of rejection of the null hypothesis was set at 1% ($p < 0.01$).

Ethical aspects

This study met all ethical requirements in accordance with National Health Council (CNS) Resolution No. 466/2012, which contains guidelines and regulatory standards for research involving human beings. Data collection began only after approval by the Research Ethics Committee of HC-UFPE under registration no. 56671222.5.0000.8807 and consent through responses to letters of consent to the Pharmacy sector, the Nephrology ward and EBSERH. An Informed Consent Form was not issued, as the study analyzed a database from the clinical pharmacy sector, not involving the direct participation of the subjects involved. Only the information provided during the application of the medication reconciliation form was used, an activity that is already part of the sector's clinical routine.

Results and discussions

250 forms were collected (Table 1), applied during the medication reconciliation process, to check the presence of discrepancies. It was observed that 1.6% (n=4) of users did not use medication; 27.2% of the forms (n=68) did not record medication discrepancies; 8% (n=20) of the forms were incomplete regarding the classification of discrepancies; 63.2% (n=158) presented some type of discrepancy classified according to its intention and documentation. Among the latter, in 32.3% of the forms (n=51) unintentional discrepancies were recorded, this value is similar to the work developed by Silva *et al.* (2021) who identified the presence of 33.3% of discrepancies unintentional.

As a result, it was noticed that there is a greater number of discrepant prescriptions issued during the admission of nephrology patients. However, the number of UD is low, which consist of errors in transferring medications due to the attending physician's lack of knowledge (Ebbens, 2021). UD are preventable episodes that can cause harm to the patient (Härkänen *et al.*, 2018), being considered one of main reasons for morbidities due to clinical consequences, which can lead to prolonged hospitalization days and an increase in the possibility of related adverse events occurring. to medications (Belda-Rustarazo *et al.*, 2015).

Table 1.
Distribution of findings obtained through the reconciliation forms applied in the nephrology ward of HC-UFPE from January/2021 to January/2022, Recife-PE.

Forms analysis	N	Frequency (%)
Absense of medicine drugs	4	1,6
Incomplete forms regarding the classification of discrepancies	68	27,2
Absense of discrepancy	20	8
Presence of discrepancy	158	63,2
TOTAL	250	100

Source: Own Authorship (2022).

1384 medications used by patients before hospitalization were identified. Among these, 32.4% (n=449) of medications were prescribed with some discrepancy during hospital admission; 12% (n=166) had intentional discrepancies; 8.3% (n=115) were not classified according to intentionality and documentation; 6.4% (n=89) unintentional discrepancies and 5.7% (n= 79) undocumented intentional discrepancies (Graph 1). In clinical practice, medication discrepancies are common, and can vary between 34% and 95% of patients newly admitted to hospitals (Tam et al, 2005; Wilson et al., 2017; Van Der Gaag *et al.*, 2017). Percentages may differ according to the degree of medical and social support among patients, as well as the level of medical assistance required.

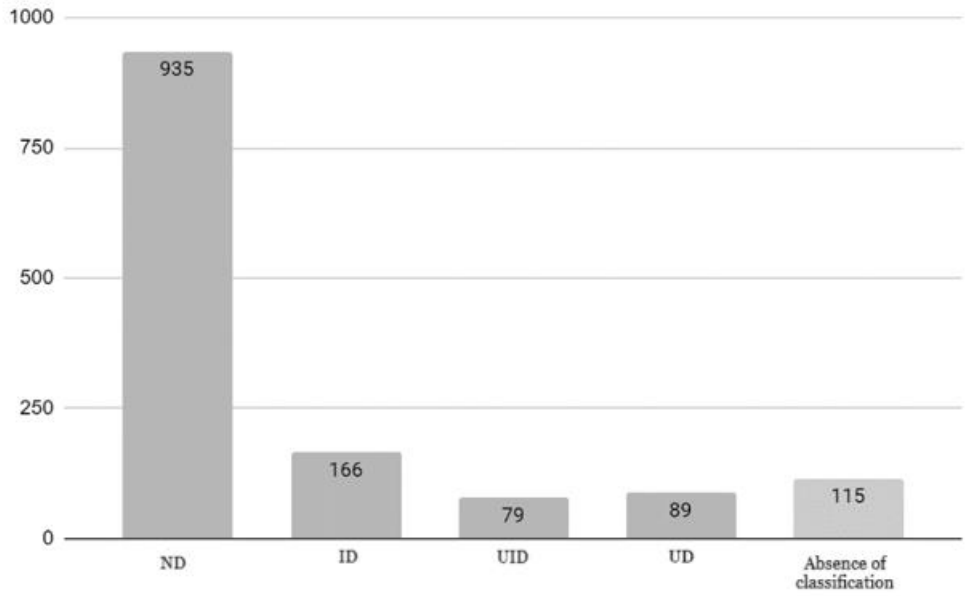
This study was developed with patients from a ward that has the presence of a clinical pharmacist and pharmaceutical residents in nephrology. Therefore, it is an environment in which education focused on the use of medication is frequent, which certainly reduces the number of medication-related errors. Providing knowledge to patients generates a significant increase in medication adherence among patients with chronic kidney disease. This can be attributed to the simplification and demystification of aspects of their treatment and condition, which are often quite confusing and poorly understood (Chandrasekhar *et al.*, 2018; Daifi *et al.*, 2021; Cooney *et al.*, 2015; Song *et al.*, 2021; Al-Abdelmuhsin *et al.*, 2020).

Daifi *et al.* (2021) evaluated the impact of implementing a clinical pharmacist in monitoring patients with chronic kidney disease, verifying savings of US$447,355 by reducing length of stay and readmissions; adequacy of clinical parameters (reduction in blood pressure) and laboratory parameters (adequacy of phosphorus, calcium, parathyroid hormone and vitamin D values) and improvement in compression in the use of medications and consequent adherence after interventions. The pharmacist plays an important role in preventing medication-related problems and unintentional medication discrepancies in patients with chronic kidney disease (Song *et al.*, 2021).

As medication management experts, pharmacists are in an excellent position to help decrease patient medication errors, reduce cardiovascular risk, assist with disease management, and produce substantial cost savings (Al Hamarneh *et al.*, 2018; Daifi *et al.*, 2021). Chandrasekhar *et al.* (2018) found that more than half of participants in their study believed that guidance on the use of medications should be the responsibility of the pharmacist and not their doctor.

Graphic 1.

Distribution of the quantity of medications according to intention and documentation according to forms applied in the nephrology ward of HC-UFPE, Recife-PE.



ND- No discrepancy; ID- Intentional discrepancy; UID- Undocumented intentional discrepancy; UD- Unintentional discrepancy. Source: Own Authorship (2022).

Regarding frequency (Table 2), furosemide (n=13) and metformin (n=13) were medications most associated with intentional discrepancies, that is, they were changed in response to the patient's clinical condition; amlodipine (n=7) was the most frequent when referring to undocumented intentional discrepancy, this identification helps to avoid duplicate therapy and potential harm during transitions of care, while vitamin D/calcitriol (n=9) was the medication most associated with unintentional discrepancies, this circumstance is justified by frequent laboratory monitoring and subsequent dose adjustments that generate nonconformities between home prescription and that used during hospitalization.

Identified results here coincide with what is evidenced in the literature, which reports a greater link between medications related to kidney and cardiovascular diseases and medication discrepancies (Wilson *et al.*, 2017; Phillips *et al.*, 2017; Ebbens *et al.*, 2019). It is worrying

to note that cardiovascular medications are among the medication classes most commonly linked to discrepancies due to their hemodynamic and metabolic effects (Ibrahim *et al.*, 2017).

Table 2.

Frequency of the five most reported medications according to intention and documentation according to forms applied in the nephrology ward of HC-UFPE, Recife-PE.

ID		**UID**		**UD**	
Med drugs	*Frequency*	*Med drugs*	*Frequency*	*Med drugs*	*Frequency*
Furosemide	13	Amlodipine	7	Vitamin D/Calcitriol	9
Metformin	13	Simvastatin	4	Ferric Hydroxide Saccharate	6
Prednisone	12	Atorvastatin	3	Simvastatin	6
Enalapril	11	Carvedilol	3	Erythropoietin	5
Losartan	9	Iron III	3	Alopurinol	3

ID- Intentional discrepancy; UID- Undocumented intentional discrepancy; UD- Unintentional discrepancy. Source: Own Authorship (2022).

On average, each patient used 6.0 ± 3.0 medications. This result is lower when compared to other studies carried out with nephrology patients, which used an average of more than 10 medications (Phillips *et al.*, 2017; Dyer *et al.*, 2022; Hawley *et al.*, 2019; Liu *et al.*, 2021). Its occurrence is due to the fact that nephrological patients have other comorbidities associated with the kidney problem and consult doctors from other specialties, generating an increasing increase in the amount of medications prescribed (Wilson *et al.*, 2017; Phillips *et al.*, 2017). In the present study, an association was identified between polypharmacy and the occurrence of discrepancies ($p<0.01$) (Table 3), which was evidenced when restricting the association to unintentional discrepancy (Table 4). Several studies have been carried out with the aim of determining the risk factors for medication errors upon admission. A review by Hias *et al.* (2017) identified sixteen variables associated with medication errors, of which advanced age and polypharmacy were the most relevant risk factors.

Eliminating unnecessary medications should be an ongoing effort to improve patient safety. Reducing medication discrepancies in chronic kidney disease requires: a thoughtful approach to medication reconciliation, the sharing of accurate medication information among healthcare professionals, and appropriate patient medication education as a better understanding of medication discrepancies is likely. medications and their purpose increase patient compliance and limit errors. (Ibrahim *et al.*, 2017).

Table 3.

Distribution of the association between polypharmacy x occurrence of discrepancy according to forms applied in the nephrology ward at HC-UFPE. Recife, 2022.

		Discrepancy Occurrence		Total
		Yes	No	
Polypharmacy	Yes	105	36	141
	No	53	56	109
	Total	158	92	250

Source: Own Authorship (2022). *p=0,000026*

Table 4.

Distribution of the association between polypharmacy x occurrence of unintentional discrepancy (UD) according to forms applied in the nephrology ward at HC-UFPE. Recife, 2022.

		UD Occurrence		Total
		Yes	No	
Polypharmacy	Yes	42	99	141
	No	9	100	109
	Total	51	199	250

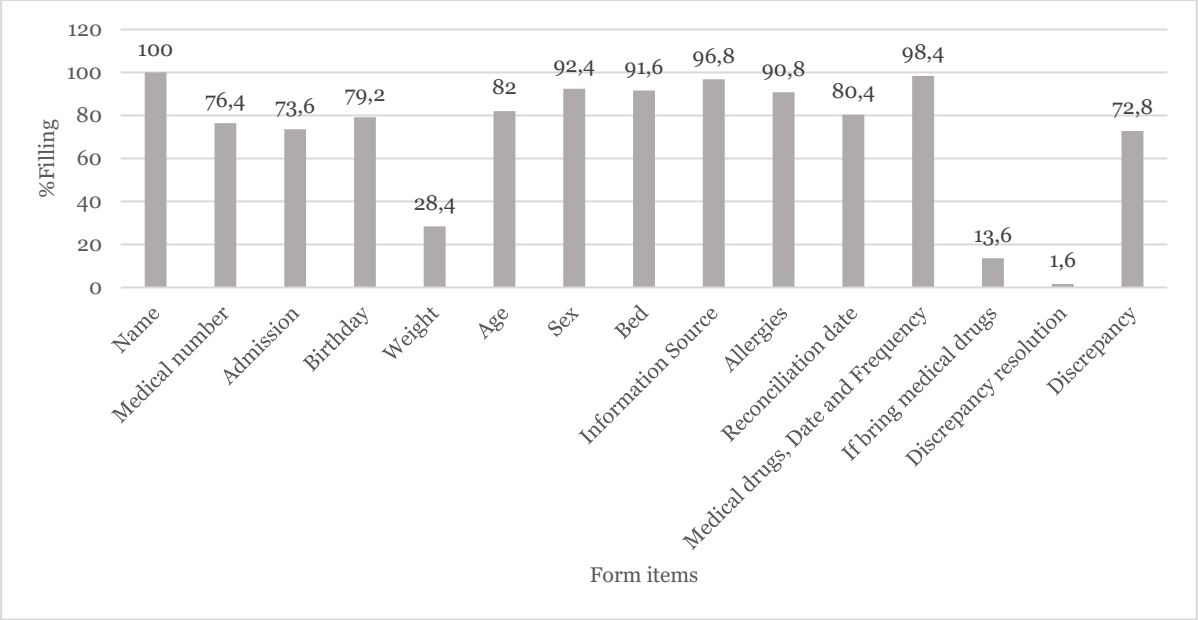
UD- Unintentional Discrepancy. Source: Own Authorship (2022).
p=0,000028

When the completeness of the requirements filled in the form is analyzed, the following results were obtained: 96.8% of the forms had the source of information; 73.6% the date of admission; 80.4% date of reconciliation; 100% included the patient's name; 92.4% sex; 82% age; 79.2% date of birth; 28.4% weight; 91.6% bed; 76.4% medical record number; 90.8% allergies; 98.4% presented the name of the medicine, its dose and frequency; 72.8% disclosed the type of discrepancy, 13.6% had information on whether the patient had brought the medicine and 1.6% presented information on whether the discrepancy had or had not been resolved (Graph 2).

The most complex part of medication reconciliation is obtaining the best possible medication history (BPMH). The BPMH is a comprehensive, systematically derived list of regularly used medications. Obtaining an accurate and complete medication history is crucial as it forms the basis of medication reconciliation from admission to discharge. Incomplete or inaccurate medication history can increase the risk of medication-related errors and complications (Johnston *et al.*, 2010).

Graphic 2.

Percentage distribution of completion of the items contained in the form applied in the nephrology ward at HC-UFPE. Recife, 2022.



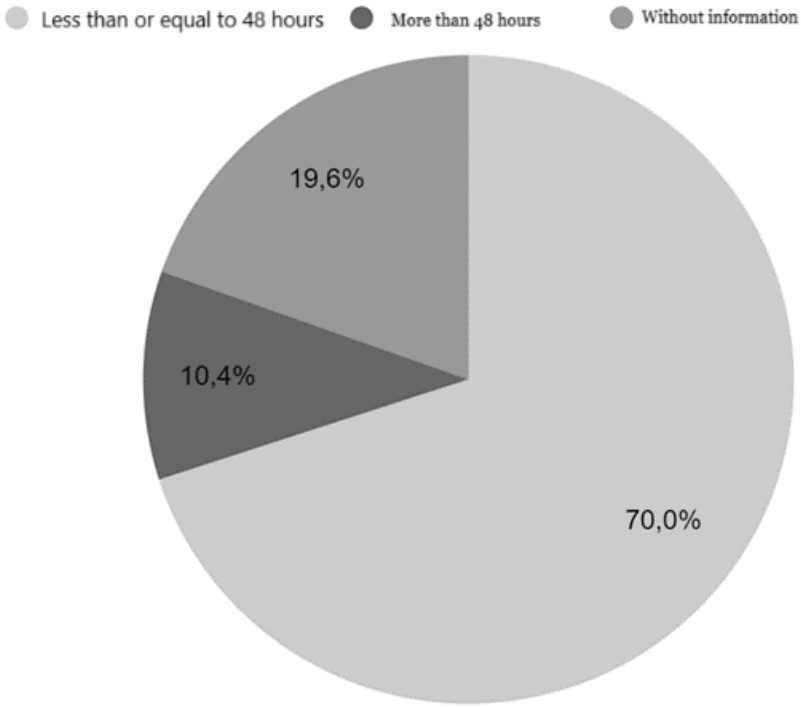
Source: Own Authorship (2022).

The indication of whether or not discrepancies were resolved was the least documented item in the study. This information must always be recorded during the reconciliation process, as it helps to measure the quality of the service performed by the pharmacist. This indicator also provides support for decision-making by managers of the multidisciplinary team, as it facilitates the identification of priorities and the improvement of the quality of care (Luz *et al.*, 2017). Another information that was less recorded was the indication that the patient had brought the medication from home, which would help the patient in the face of a shortage, given the constant shortages of medication in public hospitals (Araújo *et a.l*, 2017). In this case, the doctor would not need to change a certain prescription upon becoming aware of the patient's possession of it. Regarding weight, many medications use the patient's weight as the basis for calculating the dose, therefore, the absence of this data would make it impossible for the pharmacist to check the suitability of the dose.

The time for reconciliation was mostly equal to or less than 48 hours after the patient's admission (70%, n=175); 10.4% (n=26) performed after 48 hours and 19.6% of forms (n=49) did not contain information regarding admission or the date of execution of the process, making it impossible to know the deadline for the process to occur (Graph 3). According to the literature, reconciliation must be carried out within 24 hours of admission (The Joint Commission, 2021). Despite this recommendation, the clinical pharmacy service in this ward only operates from Monday to Friday. Therefore, to accommodate patients admitted on weekends, a maximum interval of up to 48 hours was determined for reconciliation to take place.

Graphic 3.

Percentage distribution of time taken to carry out medication reconciliations according to forms applied in the nephrology ward at HC-UFPE. Recife, 2022.



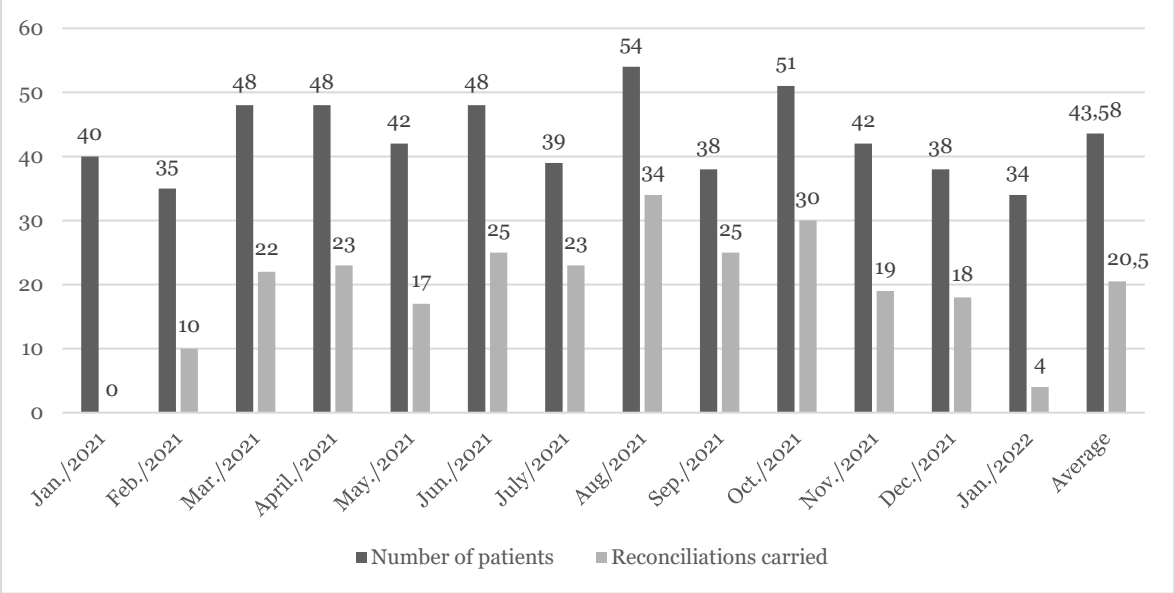
Source: Own Authorship (2022).

The month of August/2021 presented the highest number of reconciliations carried out (n= 34), a coverage corresponding to 62.96% of hospitalized patients, however the month of January/2021 did not see any medication reconciliation being carried out and January 2022 presented coverage of 11.76% (n=4), the general average of service execution was 44.88% (Graph 4). It is important to report some individualities of the sector when interpreting data relating to service coverage, as clinical pharmacy is mostly performed by resident pharmacists and medication reconciliation is carried out mainly by pharmacy residents. However, the latter moves between different specialties, not remaining fixed in the ward studied. Thus, this variation in percentages over the months may be related to the variation in the number of pharmacists working in nephrology, vacations, licenses and other inconveniences related to human

resources management. Another aspect to be considered is the cause of patients' hospitalization. In some cases, they remain hospitalized for just one day to perform procedures such as biopsies, and the patient may be discharged even before reconciliation takes place.

Graphic 4.

Quantitative distribution of the number of patients x reconciliations carried out according to forms applied in the nephrology ward at HC-UFPE. Recife, 2022.



Source: Own Authorship (2022).

Some limitations were identified in the present study. As this was a retrospective study, it was not possible to obtain the patients' sociodemographic data, and it was also unfeasible to obtain the informed consent form. The main researcher also worked on carrying out the reconciliations, but, to limit bias in the evaluation of the process, all data were collected using standardized forms and the pharmacist responsible for filling out forms was not identified.

Conclusion

In this study, a low prevalence of unintentional discrepancies was found during the admission of nephrology patients. However, it was observed that greater attention should be paid to medications that require laboratory monitoring and subsequent dose adjustments, such as Vitamin D/Calcitriol. Furthermore, a statistical association was identified between polypharmacy and the occurrence of discrepancies, which reinforces the need for careful reconciliation of medications and consequent patient safety.

Reconciliations were mostly carried out within a maximum interval of 48 hours and had variable monthly coverage. A low prevalence was identified in the recording of the

resolution or not of discrepancies, which indicates the need for continuous training of the team and monitoring of the service. The information obtained should be used to seek new strategies, allowing improvements in the medication reconciliation process and providing greater security for kidney patients.

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