Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i4.5736

ENHANCING PATIENT SAFETY THROUGH MEDICATION RECONCILIATION IN SMALL HOSPITAL SETTINGS: A PROSPECTIVE ANALYSIS

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ABSTRACT:
Background: Medication reconciliation and discharge advice play crucial roles in identifying and mitigating medicine-related risks, particularly during transitions of care. Despite their significance, the extent of clinical pharmacy involvement in small hospitals remains underexplored.
Objective: To conduct a prospective study assessing medication reconciliation and pharmacy advice provision upon patients' discharge from a small hospital setting.
Methods: A pilot, prospective, descriptive, and exploratory study involved thirty hospitalized patients. Their medication regimens were monitored from admission through discharge, including the matching of medications and provision of pharmaceutical instructions.
Results: The majority of patients were female (57%) with an average age of 71, hospitalized for an average of three days. Pyelonephritis was the primary admission diagnosis (23%), while high blood pressure was the most prevalent comorbidity (60%). Medications predominantly targeted the nervous and circulatory systems (37%). Discrepancies in medication records totalled 100, with 10% intentional changes, primarily through drug substitution (70%), and 90% unintentional, mainly involving omitted medications (98%). 95% of pre-hospitalization drugs were implicated in discrepancies, with the coronary system most affected (42%). Documentation gaps were noted in medical records regarding patients' comorbidities, with omissions observed in both physician (50%) and nursing (25%) entries. The discharge medication list only accounted for 43% of administered

drugs. Therapeutic discrepancies were prevalent, mainly due to unintentional omissions, highlighting the risk of medication omission during transitions of care.
Conclusion: Medication reconciliation and discharge advice play pivotal roles in enhancing patient safety during transitions of care. However, the study underscores significant gaps in clinical pharmacy involvement and documentation practices in small hospital settings, emphasizing the need for improved strategies to ensure medication safety and continuity of care.

KEYWORDS: Medication Reconciliation; Patient Safety; Patient Discharge; Hospital Pharmacy Service; Pharmaceutical Assistance.

INTRODUCTION:

Patient safety is an important part of good hospital health services, and it shows how good the care is. One of the most shocking events in patient safety is medication errors, which can have very bad effects that can be avoided. One way to cut down on drug mistakes or fix them is to find them quickly. Making sure that the patient's medications are correct is an important and effective way to find and reduce risk factors (Hernandez, Barisano, Welsh, Rosano, & Papiro, 2024).

Medication reconciliation involves collecting all the necessary information from the patient or their guardian to make a detailed list of all the medications that the patient has used before admission, transfer, or discharge from the hospital. This includes looking for clinical information that is relevant to the patient's treatment. This information is checked against the patient's medical record and his prescriptions that are kept in the hospital. Potential medication mistakes can be found, stopped before they happen, or even lessened with pharmacological reconciliation (Hoffman, Walls, Prusch, & Roberts, 2024; Mundell, Jamieson, Shaw, Thomson, & Forsyth, 2024).

The World Health Organization (WHO) recommends that medication reconciliation be done. This helps lower the number of drug-related issues and bad events that happen. Understand each other's drug problems, such as those that come from pharmacotherapy and have clinically bad effects or that get in the way of therapy or cause unwanted effects (Tasseff, Axtell, & Nixon, 2024).

Several studies have shown that the change from one level of Healthcare to another is a key stage in a process that is especially prone to medication mistakes during hospitalization and discharge. Quite often, these mistakes happen because data is missing in the file at the time of entry. This can cause more mistakes to occur while the patient is in the hospital and in other parts of their care (Promraj, Susomboon, Tovikkai, & Kositamongkol, 2024).

A further significant pharmaceutical service in a hospital setting is discharge orientation. This is when the patient requires responsibility for their medication therapy, and there will be a change in care. It is also a time when medication errors are more likely to happen because the patient is doing everything on their own. When a patient is released from the hospital, the pharmacist gives them instructions on how to take the drugs they were given. These instructions help reduce therapeutic errors and promote the right use of drugs, which is also an important safety measure (Farajallah, Zainal, & Palaian, 2024).

Legally, a pharmacist's knowledge guides the use of medications after a patient leaves the hospital. For example, Resolution No. 585 of the Federal Association of the Pharmacy says that pharmacists should make sure that drugs are used properly, that pharmacotherapy works well, and that patients' quality of life is improved. In addition to the many jobs listed, the pharmacist can help with things like getting patients out of the hospital, making sure they have all of their medications, finding problems, making sure they stick to their treatment plans, and giving advice on different aspects of drug-based treatment (Bormann, Brower, & Forshay, 2024; Rahuel, Pautrat, Aïdoud, Fougère, & Debacq, 2024).

Hospital clinical pharmacy activities are common in many hospitals, but this area of business is still not well known in small hospitals. In these situations, the pharmacist usually only provides goods and services and doesn't help with patient care or work with a diverse team. People who work in the pharmaceutical industry only need to add clinics to their list of institutions where they work. This

puts them in a great position to actively prevent disease and promote health, which has a lot of positive effects on public health as a whole (Yamamoto, 2024).

So, even though larger hospitals have changed their clinical pharmacy services, smaller hospitals have not yet. This is the truth. There aren't many studies that look at reconciliation and pharmacological direction after you leave a small hospital. There aren't many studies in the scientific papers that look at the role of drugs in hospitals in Brazil. The ones that do are mostly about the clinical work of the pharmacist (Rangchian et al., 2024).

Also, studies have shown that contact pharmaceutical services are only found in medium- to big hospitals, even though they are not common. Studies about pharmacy clinics in small hospitals are important because these hospitals also serve the public. However, time changes things, and the practices used in large hospitals likely need to be changed to fit the needs and realities of smaller hospitals. So, plans are also required to help the pharmacist become a part of the hospital's team of professionals in a way that is both successful and safe for patients (Mahomedradja, Tichelaar, Mokkink, Sigaloff, & van Agtmael, 2024).

As a general rule, small hospitals don't have organized pharmaceutical services that make sure patients use drugs they already have at home in the best way possible. They also don't teach the patient and their companion about pharmacotherapy when they leave the hospital. The goal of this study was to look at reconciling medication services and pharmacotherapy guidance after leaving a small hospital (Sheth et al., 2024)

METHODOLOGY:

A prospective and observational exploratory study was done with thirty patients from Paraná who were taken into a hospital in the northwest area. As a health hub in the area, it's a small hospital with 36 operational beds that has a general profile and a low level of complexity. From June 20, 2022, to July 1, 2022, interviews with patients, family members, or caregivers, as well as a look at the medical record, were used to gather data (Sellers, Wright, Wallace, & Nieuwstraten).

The form that was used had questions about the patient's gender, school level, age, and other demographic information, as well as their clinical data and drug treatments. It was based on a form by Silva et al. People over the age limit of 18 were able to take part in the studies that were impacted by at least one comorbidity and the drug therapy that was given. The dressing was done within 48 hours of the patient being taken to the hospital using a form that had already been made (de Oliveira, Romeiro, Rodrigues, Varallo, & Leira Pereira, 2024; Henman, Ravera, & Lery, 2024).

The Free and Informed Consent Form (TCLE) was signed by all patients who were taking part. Patients with cognitive, motor, or physical problems had a family member or friend sign the form on their behalf. It was decided that patients who were released from the hospital while the pharmacist wasn't there to do the guide were not included because the hospital only has one pharmacist who works 40 hours a week (Canning et al., 2024).

Reporting of hospitalized patients happened through an information technology system (G-HOSP®), and the pharmacist got a message letting them know about the entry. After being hospitalized and pharmaceutical reconciliation, differences between the list of medicines the patient utilized at home and the ones prescribed by the hospital were found and described as medication-related (Gormley, Mullins, & Sylvia, 2024).

Any difference between the medicines the patient had before going to the hospital and the medicines they were given while they were there was considered intentional. If there was an involuntary difference between what the patient said and what the hospital prescribed, it was considered an error. It was categorized as omission, wrong dose, wrong dosage, route of administration changed, duplication, omission of medications with no standard and so on. Alanazi et al. have used these definitions and groups of differences in their work (Butler et al., 2024).

The same patients have been watched over since you left the hospital while the drugs were being re-administered. In this process, the pharmacist was in charge of bringing prescriptions to patients and their families and giving them the help they needed. All medications given at discharge were talked over in terms of dosage, storage, and how they might interact with foods. The patients were also

told where they could buy the medicines they were given. It has been looked at and compared with the patient's past list of medications and the drugs provided by their doctor in the hospital setting. In Figure 1, the steps that need to be taken to complete the process of medication reconciliation and high-level advice are shown (Pitman, Clouse, Hiner, & So, 2024).

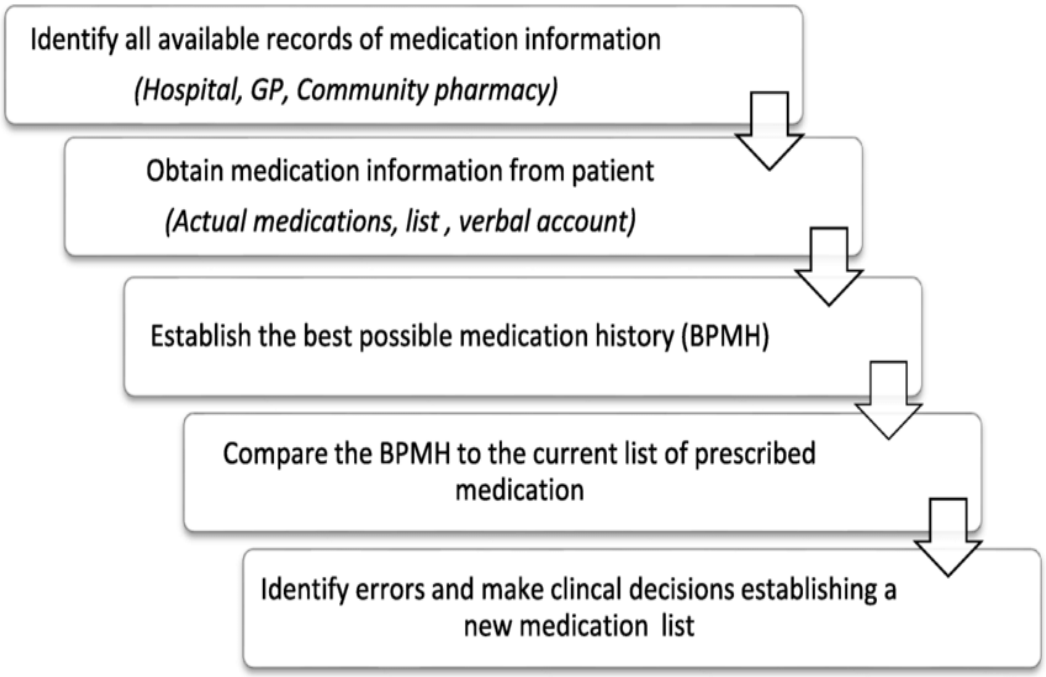

Figure 1: Steps that have been set out for implementing medication reconciliation and pharmaceutical advice at the time of hospital discharge

The collected data were put into an electronic spreadsheet so that the relative frequency could be calculated. The data were then typed into an electronic spreadsheet and studied with the help of Microsoft Office Excel® software. The technical council of the hospital and the Board of Research Ethics at the State University of Maringá gave their official approval to this work. It is registered under the number 56994922.9.0000.0104 (opinion No. 5454507) (Bailly et al., 2024).

RESULTS:

Between June 20 and July 1, 2022, 41 people were admitted to the institute. They were given medication reconciliation and discharge advice. Of these patients, 30 were women (57%). The patients were between the ages of 43 and 96, with a mean age of 71. The number of patients who had finished primary school was higher (37%), as shown in Table 1 (Al Musawi et al., 2024).

Seven (23% of all hospitalizations) were due to pyelonephritis, and three (10%) were due to digestive system problems. When it came to comorbidities, hypertension was the most common (60%), and diabetes was the second most common (43%). Fifteen patients (50%) had only one disease, while the other fifteen had two or more (Table 1) (Očovská, Procházková, Maříková, & Vlček, 2024).

CHARACTERISTICS	VALUES
Gender	
Female	17(57%)
Male	13 (43%)
Age range (years)	
40-49	1(3%)
50-59	5(17%)
60-69	6(20%)
≥70	18(60%)

Education level	
Fundamental incomplete	10(33%)
Fundamental complete	11(37%)
Complete secondary education	9(30%)
Complete higher education	0(0%)
Several comorbidities:	
1	15(50%)
Two or more	15(50%)
Baseline Disease:	
High blood pressure	18(60%)
Diabetes	13(43%)
Cardiopathy	6(20%)
Disease of the Central Nervous System	6(20%)
Hypothyroidism	5(16%)
Disease of the Respiratory System	4(13%)
Reason for Hospitalization/CID*:	
Pyelonephritis–urinary tract infection/N390	7(23%)
Digestive tract disease Digestive tract disease not specified/K929	3(10%)
Dehydration–unspecified metabolic disturbances/E889	2(7%)
Pneumonia–Unspecified Pneumonia/J189	2(7%)
Bronchiolitis–Bronchititis/J219	2(7%)
DiabetesMellitus–Diabeteswithoutcomplicationsunspecified/ E149	2(7%)
Acute gastroenterocolitis–intestinal infection not specified/A084	2(7%)
Lower airway – COPD/ J449	2(7%)
Diabetic treatment – insulin-dependent diabetes/E108	2(7%)
Heart failure, unspecified/I509	2(7%)
Respiratory insufficiency – Respiratory discomfort/J80	1(3%)
Convulsion/G419	1(3%)
Classic Dengue/A90	1(3%)
Cirrhosis of the liver–Unspecified liver disease/ K769	1(3%)

Table 1: A list of the 30 patients who were brought to a small hospital in the northwest of Paraná between June 20, 2022, and July 1, 2022

Patients took anywhere from one to eight medications before they went to the hospital. Three medications were the most common medications taken each day. Most drugs were used two times, or 37% of the time. As the information for medication reconciliation was being gathered, 43 different types of drugs that had been used before were noted (Table 2). Eighteen of them (60%) were part of the standardization of drugs in hospitals. In the past, drugs that helped the nervous system and heart were the most common (37%) (Leung et al., 2024).

ATC Classification*	Groups	N(43)–%
N	Nervous system	16-37%
W	Cardiovascular system	16–37%
R	Respiratory system	5 –12%
A	Dietary tract and Metabolism	5 –12%
H	Systemic Hormone Preparations, excluding sex hormones	1-2%
B	Antithrombotic agents	1 –2%

Table 2 shows the ATC classifications of groups of drugs that patients admitted to a small hospital in the northwest of Paraná between June 20, 2022, and July 1, 2022, had used in the past.

When the 30 patients' prescriptions were checked again, 100 differences were found. Of these, ten were made on purpose (10%), and 90 were made on purpose but not on purpose (90%), as shown in Table 3 (Khartabil, Haghparast, Al-Chokachi, & Clemens, 2024).

Discrepancies(n = 100)	
Intentional(n=10)	Medication replacement (n=7–70%)
	Medical decision to not prescribe (n=2–20%)
	Change in dose (n=1–10%)
Unintentional (n=90)	Omission of medicines (n=88–98%)
	Dose change (n=1 – 1%)
	Change in dose (n=1 – 1%)

Table 3 shows how planned and unintentional discrepancies are grouped.

Out of the 43 types of medicines that patients had used before, 41 (95%) were involved.
90% of the time, as shown in Table 4. The drug class most often involved in the differences was Cardiovascular System (41.875%). However, metformin was the drug most often involved in a single case, with 11 cases (12.2%), which is in class A (Dietary trait and Metabolism) according to the ATC classification (Moshman, Martirosyan, & Sibblis, 2024).

ATC Classification*	Groups	N=90	%
W	Cardiovascular system	N= 37/90	4.,875%
N	Nervous system	N=25/90	26.575%
A	Alimentary Tract and Metabolism	N= 16/90	17.75%
R	Respiratory System	N=6/90	6.675%
H	Systemic hormonal preparations, excluding sex hormones	N=5/90	6%
B	Antithrombotic Agents	N=1/90	1.125%

Table 4 shows how often a group of previously used medicines was involved in both planned and unintentional discrepancies based on the ATC classification.

During the patient's stay in the hospital, the doctor gave anywhere from 3 to 13 different units of drugs. On average, the hospital doctor had seven different medications per prescription. Most of the

time (30%), six different units of medicines were given per prescription. In this study, healthcare records were also looked at in the patient's office. As with not including drugs in prescriptions, we noticed that in 15 of the patients whose records we looked at (50%), the doctor did not name the diseases that the patient had. It also didn't say anything about the patient's other health problems in seven cases (24%) (Szwak et al., 2024).

People who were admitted to the unit were hospitalized for anywhere from one to seven days. The typical duration of stay was three days. It took three days most of the time for people to stay in the hospital. When they got out of the hospital, the doctor gave them between one and seven drugs to take at home for care. The average number of medications per order was four. The average amount of drugs given out at release was 4 (30%) (Avvaru et al., 2024; Loh, 2024).

For the 30 patients who were given pharmaceutical indications at discharge, 51 different types of drugs were recommended in various ways. Following general anti-infectives for systemic use (20%), the group of drugs most often given was those for the digestive tract and Metabolism (28%). Only 22 (43%) of the 51 types of medicines that were given at discharge were on Engineer Beltrão's Municipal Medicines List (Chandran et al., 2024).

ATC CLASSIFICATION*	GROUPS	N (51)–%
A	Dietary tract and Metabolism	14-28%
J	General anti-infectious agents for systemic use	10–20%
N	Nervous system	7-14%
W	Cardiovascular system	5-10%
R	Respiratory system	5-10%
B	Antithrombotic agents	3-6%
M	Musculoskeletal system	3-6%
D	Dermatological medications	1-2%
P	Antiparasitic, insecticide and repellent products	1-2%
V	Various	1-2%

*Table 5 shows the groups of drugs that patients were given when they were sent home from a small hospital in the northwest of Paraná between June 2022 and July 1, 2022, based on the ATC classification**

DISCUSSION:

The goal of this study is to look into pharmaceutical drug balancing services and how to start pharmacotherapy after leaving the hospital since that hospital does not have any pharmaceutical clinical services. This information helped find mistakes that directly put patients at risk, like drug errors that happened a lot. International studies have also kept an eye on the patient from the time he was admitted to the hospital until he was sent home (Lee et al., 2024).

These studies include one from Schullo-Feulner, Krohn, and Knuston in the US, Studer et al. in Switzerland, Bonaudo et al. in Italy, and Daliri et al. in the Netherlands. Table 1 has information that can be found online, along with the outcomes of other studies, like those by Finardi Filho et al., Fernandes, Mattos, Barbosa, and Mota et al. It was found that older people knew the age range of the study's most common patients. This was expected because older adults use health services more often. As a result, the clinical pharmaceutical service in the hospital is seen as important, especially for older people who are more likely to have problems with drugs during the transfer of care (Mills et al., 2024).

In terms of how many medicines patients took before going to the hospital, these results are similar to those from di Silva, Zarpelon, and Laureano, who found that patients took an average of 4 drugs

before going to the hospital. A study about medication reconciliation in hospitals in Lebanon found a link between the number of drugs used before admission and mistakes that were not made on purpose. This study found that drug substitution was the most common deliberate difference (70%). Lombardi et al. found that the most common purposeful difference was leaving out medications (82.8%), followed by differences in dose (17.2%) (Hahn et al., 2024; Ojo et al., 2024).

After talking to the doctor, intentional differences were seen as acceptable. In 86% of cases, the prescribing doctor agreed to the intervention drug when there were differences that were not their fault. Most of the time, prescribers said that the drugs that weren't on the order were left off because the patient would be held responsible for giving themselves medicines that they had already used. However, the Ministry of Health says that the patient's medicines shouldn't stay with them in the hospital room because a mistake could happen. Also, patients and their loved ones are often too weak while they are in the hospital, which can make mistakes more likely when drugs are given, even if the person has used the drug before (Treadwell, Jepson, Ivlev, & Reston, 2024).

The results of this study were mostly different from those of Silva et al. because 90% of the differences were not the subjects' choice. Deliberate discrepancies made up 66.7% of the study, while involuntary discrepancies made up 33.3%. Sousa, Tofani, and Martins found an outcome that was identical to this study. Their major finding was that a drug was left out or added because it was needed but not on purpose (81.5%). In the research conducted by Lombardi et al., 50.4% of the differences were not meant to be there, while 49.6% were meant to be there (Fentie et al., 2024).

Alfaro-Lara did a systematic review of 25 drug reconciliation studies and found that 16 of them showed that the omission was a discrepancy that happened more often than not and was not intentional. These studies found similar results. The types of drugs that are causing the problems depend on the patient's description. Table 4 shows the results of this study, which back up what Silva, Zarpelon, and Laureano found: drugs that affect the cardiovascular system were most often involved in mistakes, with 47% of those mistakes being intentional and 42.9% being unintentional (Lekpittaya et al., 2024).

In one study done in a cardiac unit, drugs that affect the cardiovascular system were more common. In another study done in Italy, drugs that affect the digestive system and Metabolism were more common, followed by drugs that affect the cardiovascular system.

Regarding the number of prescription drugs given in hospitals, a study on medicine reconciliation in a Dutch hospital found that, including those taken "as needed," the average number of prescription drugs was ten. In their study, Graabaek et al. found that patients who got more drugs also had more medication mistakes than patients who got fewer or no drugs (Jackson et al., 2024).

The major differences that were found were where drugs were left out, which could be linked to missing information that should be in the medical record, like a list of comorbidities. The patient's drug background must be included in the prescription. This is a proven way to help keep patients safe by lowering accidental drug interactions. Additional investigations have shown that, in general, keeping track of how meds are used in health records is not enough (Rhoten, Jones, Maxwell, & Stolldorf, 2024).

The average length of stay in the hospital in this study was three days. However, a study in Denmark that looked at drugs given to patients after they were released from the hospital found that most patients had short stays, with an average of two days. In their study, Bonaudo et al. point out that hospital stays that last longer may be linked to a lower risk of discrepancies. This might be because spending more time in the hospital can help you understand the patient's condition better and need more attention from your therapist. On the other hand, Graabaek et al. say that when patients stay in the hospital longer, they usually see more than one doctor and their medications are changed more than once. In our study, however, there was no link between the time of stay and the number of discrepancies (Lias et al., 2024; Prasad et al., 2024).

Our study found that patients were given an average of 4 drugs when they were released from the hospital, while Magalhães, Santos, and Reis' study found that patients were given an average of 6 drugs. Only 43% of the medications prescribed to patients when they leave the hospital are available on the List of Municipal Medicines. This is something that the hospital and the

multidisciplinary approach team will look into to get more of these drugs prescribed so that more people can get pharmacological treatment. A related fact was found by Costa et al. That 46% of medicines that were given were not included in the Include of Municipal Medicines of the Municipality that made the request (Bamgboye et al., 2024).

According to several new studies, medication reconciliation while in the hospital is an effective way to find and lower drugs that don't match up, which helps keep the patient safe during the transitional stages of care. As Silva, Ribeiro, and Arruda have already said, pharmaceutical care is important for improving the quality of life of hospitalized patients because it can help them use their medications more wisely and is also a great way to prevent, find, and fix problems with drugs because it's easy to get to patient and medical records, the medical staff, and research sources (Balaban et al.).

Some problems were found with our study. For example, the hospital did not have a pharmacy service centre at the time of this study, and only one pharmacist was working there. This is similar to what happens in many small and medium-sized hospitals in Brazil, where pharmacy clinical practice has not yet been looked into. This is usually the case. The chemist can only do the management part of their job (Liang, Feng, Zhu, & Yang, 2024; Ndai, Morris, Winterstein, & Vouri, 2024).

CONCLUSION:

This study showed that there were a lot of differences in the drugs that were given to patients after they were admitted to the hospital, especially when they weren't willing to take them. This shows that meds are often missed. Many of these problems might be solved by having correct and full lists of all medications given at admission and release, as well as more consistency since the medication reconciliation service and the pharmacist's discharge guide were created.

The pharmacist's guide to hospital release also helps keep patients safe because it helps avoid and solve drug-related problems that might happen after the patient goes home. For example, the patient is now responsible for their drug therapy. However, if more research is needed to look into this service, it will be used to find out about the good effects of this kind of help on the pharmaceutical business as well as any problems or risks with medications that come up at this point.

Furthermore, the study's results indicate that pharmacists should be a part of the hospital's diverse team and its clinical work. This would help the team do its job better and improve the quality and safety of the care they provide.

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