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Improving Adherence to Treatment of Tuberculosis in a Tertiary Care Setting: The Nursing, Pharmacy, Laboratory and Social Work Perspectives of a Multidisciplinary Approach

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Abstract

Background: The multidisciplinary approach of medication reconciliation at discharge has been suggested as an effective means in reducing medication inaccuracies and resolving fundamental issues with clinical outcomes. Still in hospital settings, medication discrepancies at discharge poses an ever-increasing danger to patient safety – especially in tertiary units where patients are used to handling complicated therapy schedules.

Objectives: To assess the impact of multidisciplinary reconciliation of medications on discharge safety outcomes in a tertiary hospital.

Methods: An observational study of Hospitalized Internal Medicine and Surgical ward patients was carried out in a tertiary care setting. Data from two hundred and ten adult patients who were discharged were sampled for this purpose. Nurses, pharmacists, lab technologists, and social workers comprised the multidisciplinary team that handled medication reconciliation at discharge. Captured data integrated demographics of the patients, types of discrepancies noted, description of amendments carried out, and outcomes thirty days post discharge. Analysis was performed using descriptive and inferential techniques.

Results: Conducting complete medication reconciliation led to significantly lower rates of 30-day readmissions among patients, down to 8.1%. This figure stands in sharp contrast to the 22.7% rate observed among those with unresolved discrepancies, with p value < 0.05. Among 327 discrepancies noted, omission errors were the most common, constituting 45.6%. As a whole, pharmacists performed most of the interventions (48.9%) with nurses working slightly behind at 32%.

Conclusion: Through the use of a multidisciplinary approach, the reconciliation of medications during discharge substantially decreased the discrepancies identified, improved patient outcomes, and lowered the readmission rates. The integration of team-based reconciliation as a standard policy in tertiary care hospitals serves to improve patient safety.

Keywords: Tertiary Care Hospitals, Medication Reconciliation, Multidisciplinary Teams, Medication Errors, Readmission Rates, Hospital Discharge, Patient Safety

Introduction

Improper medication management as well as adverse drug events (ADEs) often accompany the care transitions and discharging phases of a patient's treatment. In an effort to enhance quality of care, ensure safety, and bolster a patient's medication regimen alongside the continuum of care, reconciliation of medications has proven to be one of the quintessential strategies during discharge. These risks are particularly pronounced in patients undergoing medication transitions in complex health care systems—such as tertiary hospitals—where patients may have numerous comorbidities and experience polypharmacy (Alanazi et al., 2022).

Medication reconciliation is defined as the systematic process of obtaining a patient's medications list—comparing it to the physician's discharge orders for omissions, duplications, dosing errors, and possible overlapping drugs to avoid interactions (Mazhar et al., 2017). More and more evidence points towards the importance of multidisciplinary teams for optimizing this procedure. From a different vantage point, nurses, pharmacists, laboratory specialists, and social workers contribute to the holistic understanding of accurate medication histories, identification of discrepancies, education of patients, and socioeconomic factors related to nonadherence towards the medications (Kreckman et al., 2018; Poornima et al., 2015).

Different approaches of collaboration are appreciated in the literature. For example, one qualitative study focused on nurses' medication reconciliation at discharge and reported that interprofessional collaboration enhanced patient outcome through better clarity of roles (Latimer et al., 2023). It has been demonstrated that pharmacist-initiated medication reconciliation programs significantly lower the levels of medication discrepancies and enhance patient safety of the patients when there is nursing and laboratory surveillance (Varkey et al., 2007).

Despite these advances, integrating all the professionals and some specific processes like medication reconciliation poses challenges. In addition, certain factors such as health literacy and the availability of medications after discharge, from a patient's perspective, still determine the outcomes (Soares et al., 2012). These gaps mark the borders of the problem and show the gap requiring still more sophisticated multidisciplinary approaches configured for acute care challenges.

In relation to these objectives, the study intends to assess the influence of multidisciplinary involvement in medication reconciliation at discharge on the safety outcomes of patients in the tertiary hospital. The study hopes to make a practical contribution to the knowledge of how to reduce medication errors

through the coordinated work of nursing, pharmacy, laboratory, and social work professionals in the seamless care transition.

Literature Review

Medication reconciliation has been consistently emphasized in the literature as an essential intervention to improve patient safety during discharge from the hospital, particularly in high-risk settings in tertiary care facilities. The process strives to make certain that the lists of medications held by the patients are correct so as not to increase the chances of drug misadventures (ADEs) or readmissions.

Riyadh has a tertiary hospital with an observational study aimed at assessing the impact of systematic medication reconciliation during discharge. The study showed that medication reconciliation at discharge reduced discrepancies at discharge and enhanced citizens' outcomes. The study pointed out the impact of well-defined protocols and active involvement of clinical pharmacists and nurses toward successful reconciliation (Alanazi et al., 2022).

Pharmacists, for instance, have been noted to be the most important actors in the process of reconciling medications. Varkey and co-workers undertook a study that is useful even if it is somewhat old. It sought to find how a multidisciplinary team, which included pharmacists, would change the face of medication errors for inpatients in an academic hospital. Their findings highlighted the importance of a pharmacist's active participation during the admission and discharge processes from the hospital to ensure medication safety (Varkey et al., 2007).

Nurses also play a critical role in contributing to medication reconciliation. A qualitative study examined nurses' perceptions regarding their roles in this process and revealed that while many nurses appreciated the value of their participation, they were often hindered by barriers such as time limitations and ambiguous role delineation. Improved interprofessional collaboration along with defined role assignments were suggested to enhance effectiveness in medication reconciliation. (Latimer et al., 2023).

As Kreckman et al. (2018) demonstrated, multidisciplinary collaboration has been equally emphasized as an essential factor for success in medication reconciliation. The author reported that creation of a transition-of-care team that included nurses, pharmacists, and case managers markedly improved rates of medication reconciliation during hospital admission, discharge, and subsequent ambulatory visits. Similar interprofessional collaboration was documented by Poornima and colleagues wherein medication errors were reduced, and patient safety was improved in the emergency department of a tertiary care hospital (Poornima et al., 2015).

Also, in Saudi Arabia, Mazhar et al. (2017) explored the prevalence of medication reconciliation errors by investigating associated risks that included high medication counts and gaps in communication among providers responsible for patient care. The authors highlighted that a well-coordinated multidisciplinary approach could mitigate these risks and improve patient outcomes.

Finally, Soares et al. (2012) in their review of interventions regarding the improvement of patient safety within transitional care, highlighted the engagement of the patients and caregivers as active participants, which should be complemented by collaboration from the healthcare team. They argue for more comprehensive approaches where not only the healthcare teams are involved, but there are also specific considerations in relation to the patients, health literacy, and access to medication after discharge (Soares et al., 2012).

As a conclusion, the use of multidisciplinary methods for medication reconciliation at discharge in tertiary care facilities is overwhelmingly supported by the literature as a means to improve patient safety. Some barriers remain, including progression stagnation due to role definitions, time boundaries, and patient participation barriers. These observations illustrate the need for strategic frameworks with defined team-based blend roles in changes for the practices.

Methodology

Study Design and Setting

A descriptive observational study design was used at a tertiary level hospital from January to December 2023. The hospital is a closed, multi-specialty, high-volume health care facility catering to a diverse population which includes complicated medical and surgical patients with significant polypharmacy. The hospital's Institutional Ethics Committee approved the study, and all participants provided written informed consent.

Study Population

The study subjects were adult inpatients (≥18 years) who were captured during the inpatient stay and were subsequently discharged from the internal medicine and surgical wards. Included patients had at least one chronic medication prescribed at discharge. An exclusion criterion consisted of patients who were discharged from the hospital against medical advice, those who were transferred to other acute care treatment facilities, or patients who were unable to provide informed consent due to a cognitive impairment and did not have a legally acceptable surrogate.

Multidisciplinary Intervention

At discharge, a comprehensive, multidisciplinary medication reconciliation process was conducted. The reconciliation team included:

- Nurses who checked medication discharge teaching and histories for accuracy and provided education to patients at the time of discharge.

- Pharmacists who performed holistic checks on discharge prescriptions to ensure all discrepancies were captured and adverse drug interactions were mitigated.

- "Laboratory specialists," who checked relevant laboratory information such as renal and hepatic function to ensure proper drug dosing and toxicity markers for drug related adverse events.

- Social workers, who evaluated patients in terms of medication access and adherence barriers and coordinated with community supportive services after discharge.

The medication list was verified through the hospital records and outpatient files. Verifications and discrepancies were described/ classified as omission, duplication, dosing errors, or interactions based on protocols. (Alanazi et al., 2022; Kreckman et al., 2018).

Collection of Data

Data were captured through a standard data abstraction form for these variables:

- Demographic characteristics(e.g. age, gender)

- Clinical characteristics (e.g. diagnosis, number of comorbidities, medications)

- Types and frequency of medication discrepancies

- Actions undertaken by the reconciliation team

- Post-discharge follow-up outcomes, in particular, readmission rate within 30 days and reported adverse drug events (ADEs)

According to the classification system proposed by Mazhar et al. (2017), these medication discrepancies, described were categorized. (Mazhar et al. 2017)

Analysis of Data

Data was documented in a locked electronic database and analyzed through SPSS. Description statistics used to summarize study participants and describe the medication discrepancies and categorical variables were computed as frequency and percentage while, means and standard deviation were computed for continuous variables.

Evaluating and describing the association of multidisciplinary approaches on the incidence of medication discrepancies and 30-day readmission rates was done through comparative analysis. Statistical significance was determined using chi-square tests and logistic regression analyses. A threshold of p-value < 0.05 was taken as significant for the study about interrogating multidisciplinary approaches impacts.

Ethical Consideration

The study was performed under the requirements of the Ethics Committee and the Declaration of Helsinki. Patients' records were anonymized to maintain confidentiality, and the individuals included in the study did so voluntarily.

Results

Study Population

A total of **210 patients** were included in the study, discharged from internal medicine and surgical wards over the study period. The mean age was **63.4 ± 12.7 years**, with a slight predominance of males (**54.3%**). The majority of patients had multiple chronic conditions, with hypertension (**68.1%**) and diabetes mellitus (**57.6%**) being the most prevalent.

Table 1. Patient Demographics and Clinical Characteristics (n = 210)

Variable	n (%) or Mean ± SD
Age (years)	63.4 ± 12.7
Gender (Male)	114 (54.3%)
Number of chronic medications	6.8 ± 2.4
Common Comorbidities	
- Hypertension	143 (68.1%)
- Diabetes Mellitus	121 (57.6%)
- Chronic Kidney Disease	54 (25.7%)
- Heart Failure	32 (15.2%)

Medication Discrepancies Identified

The multidisciplinary team identified **327 medication discrepancies** across the study population. The most common type of discrepancy was **omission errors** (**45.6%**), followed by **dose errors** (**27.2%**) and **drug-drug interactions** (**15.9%**).

Table 2. Types of Medication Discrepancies Detected

Type of Discrepancy	Frequency (n)	Percentage (%)
Omission Errors	149	45.6%
Dose Errors	89	27.2%
Duplication of Therapy	39	11.9%
Drug-Drug Interactions	52	15.9%

Type of Discrepancy	Frequency (n)	Percentage (%)
Total	327	100%

Interventions by Multidisciplinary Team

The majority of discrepancies were resolved before discharge, primarily through pharmacist intervention (**48.9%**) and nurse verification (**32.1%**). Laboratory data reviews and social worker input addressed medication safety and adherence challenges in **19.0%** of cases.

Table 3. Interventions Performed by Multidisciplinary Team

Intervention Type	Frequency (n)	Percentage (%)
Pharmacist Review and Adjustment	160	48.9%
Nurse Verification and Education	105	32.1%
Laboratory Data Review	39	11.9%
Social Work Support (Access Issues)	23	7.0%
Total	327	100%

Patient Outcomes

Following discharge, **30-day readmission rates** were analyzed. Patients who had complete medication reconciliation showed a significantly lower readmission rate (**8.1%**) compared to those with unresolved discrepancies at discharge (**22.7%**, $p < 0.05$). No medication-related mortality was reported during follow-up.

Table 4. Patient Outcomes Post-Discharge

Outcome	Resolved Discrepancies (n = 180)	Unresolved Discrepancies (n = 30)
30-day Readmission Rate	8.1% (15)	22.7% (7)
Reported Adverse Drug Events (ADE)	4.4% (8)	13.3% (4)
Medication-related Mortality	0	0

Summary

The implementation of a multidisciplinary medication reconciliation process significantly reduced medication discrepancies at discharge. Pharmacist and nursing interventions were particularly effective in resolving potential errors, and patients who received complete reconciliation had markedly lower rates of hospital readmission and adverse drug events.

Discussion

The research focused on evaluating how the discharge-associated multidisciplinary medication reconciliation process affects patient safety outcomes within a tertiary care setting. The results revealed that there were significant improvements in the medication discrepancies after a structured, multidisciplinary intervention was implemented and there was lower 30-day readmission and adverse drug event (ADE) rates.

This follows other research whereby omission errors are known to be the most common medication discrepancy. For example, omission errors represented 45.6% of all discrepancies in our investigation. Other researchers, such as Alanazi et al. (2022) noted high rates of omission errors during their observational study in a tertiary hospital in Riyadh, further highlighting the persistent dangers stemming from complicated medication schedules at discharge (Alanazi et al., 2022). Additionally, our results corroborate the findings of Mazhar et al. (2017) in which both omission as well as dose errors were cited as frequent discrepancies in tertiary care settings, highlighting the lack of adequate review processes (Mazhar et al., 2017).

In our study, the emerging role of the pharmacist was particularly striking, as they undertook almost half (48.9%) of the documented interventions. This is in keeping with the findings of Kreckman et al. (2018), who showed that pharmacist controlled medication reviews reduced discrepancies and facilitated safer care transitions (Kreckman et al., 2018). Nurses also contributed significantly, particularly in patient education and medication history interviewing, in line with Latimer et al. (2023) who highlighted the importance of nurse participation during discharge medication reconciliation (Latimer et al., 2023).

In addition, the input from laboratory specialists and social workers was critical, especially in the areas of appropriate dosing related to renal and hepatic function, and socioeconomic restrictions to accessing the medications. These multidisciplinary approaches exhibit the comprehensive aspects of care that Soares et al. (2012) advocated for, emphasizing care that addresses clinical factors along with patient-specific issues such as medication access and health literacy (Soares et al., 2012).

Remarkably, our study found that patients who benefited from complete medication reconciliation at discharge had a full readmission rate of 8.1%, significantly lower than those with unresolved discrepancies (22.7%, $p < 0.05$). This is similar to the findings of Poornima et al. (2015), which noted that the implementation of multidisciplinary approaches in the emergency department improved readmissions and advanced patient safety indicators (Poornima et al., 2015).

As encouraging as these findings are, a number of hurdles were faced. The high volume of patients, the limited availability of individual team members, and previously set schedules all occasionally restricted the depth of the reconciliation processes. In addition, although our study was successful in embedding different disciplines, there is further scope for standardization and streamlined processes with automated systems to improve the effectiveness and enduring impact of the intervention.

Strengths and Limitations

The foremost strength of this study is the multidisciplinary nature of the work, which broadens the scope of the study as it captures actual hospital care and validates the team-based medication reconciliation approach. In addition, the measurement of outcomes after discharge captures the value that can be obtained from comprehensive reconciliation.

While strengths exist, some limitations must be addressed. This single-center, tertiary-level hospital study may not be applicable to broader populations. Moreover, while all efforts were made to document medication discrepancies, undocumented over-the-counter and herbal medications may have been underrepresented. Lastly, the strongly associated outcomes remain suggestive despite the strict observational framework lacking causative assertion.

Adapting findings to improve practice implicates implementing defined multidisciplinary approaches to structured medication reconciliation in the daily workflow of tertiary hospitals. These interventions need to focus on role abstraction, professional cross-training, and patient participation to optimize the intervention's impact. The integration of electronic health record systems, along with decision support systems, could improve accuracy and efficiency concerning reconciliation chores.

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