IMPACT OF PHARMACIST-LED MEDICATION RECONCILIATION IN REDUCING MEDICATION ERRORS IN A HEALTH FACILITY

BY

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CERTIFICATION

This is to certify that this research project by **DENNIS ODUD** with a Matriculation Number of PHA1606832 has been examined and approved for the award of Bachelors of Radiography in the department of Radiography; School of Basic Medical Science, University of Benin, Benin City.

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DEDICATION

I dedicate this project to God Almighty, the giver of knowledge and his favor upon my life.

ACKNOWLEDGEMENT

My sincere appreciation goes to God, the giver of knowledge for His love upon my life. My profound appreciation and gratitude also go to my supervisor who is also the Head of Department ***** and my supervisor Pharm. (Mrs) Maria A. Aghahowa for her patience, concern, supportive and constructive idea which aided this project work. Special appreciation goes and to the entire Staff of the Faculty for the support and the various part they played in my academic development. My unreserved appreciation goes to my parents, siblings and my colleaguesfor the unending support in my life especially my education.

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ABSTRACT

Medication errors remain a major worldwide concern within healthcare systems, as they are strongly linked to adverse drug events (ADEs), extended hospitalisation, increased financial burden, and worsened patient outcomes. In Nigeria, such errors are particularly common, with research showing discrepancy rates of 40–60% during patient admission and discharge. These inconsistencies lead to ADEs in about 10–20% of cases and contribute to avoidable readmissions and even death. This study was conducted to assess how a pharmacist-driven medication reconciliation service influences the frequency and seriousness of medication errors during patient transitions at UBTH. A total of 348 patients participated and were assigned to either an intervention group (which received pharmacist-led reconciliation) or a control group (which received routine care). The demographic variables reviewed included age, gender, educational background, marital status, and length of hospital stay. Participants were fairly evenly distributed across both groups, allowing for reliable comparison. Most respondents were between 31 and 45 years old (39.7%), with females making up 54%. Approximately two-thirds of the participants had either secondary or tertiary education, while 56.6% were married. Nearly half (49.7%) had been hospitalised for fewer than five days. The study further compared the incidence of medication errors documented in medication charts and discharge summaries between the two groups. The findings showed a striking difference: only 24 individuals (13.7%) in the intervention group experienced medication errors, compared with 116 individuals (67.1%) in the control group. In fact, 86.3% of the intervention group had no errors at all, demonstrating the clear benefits of pharmacist-led medication reconciliation. With a p-value of $p < 0.001$, the null hypothesis—which proposed that there would be no significant difference in error rates between both groups—is rejected. This confirms a statistically significant reduction in medication errors among patients who received pharmacist-driven reconciliation. In conclusion, the results strongly indicate that pharmacist-led medication reconciliation greatly minimizes medication errors in the clinical setting. Patients exposed to this structured intervention experienced far fewer discrepancies than those receiving standard care. The types of errors reduced included omissions, duplications, wrong dosages, incorrect frequency of administration, potential drug interactions, and documentation mistakes all of which are known contributors to ADEs and negative patient outcomes. The study also acknowledges its limitations and offers relevant recommendations.

CHAPTER ONE

1.0. INTRODUCTION AND BACKGROUND OF STUDY

Medication errors constitute a major global public health problem, contributing significantly to adverse drug events (ADEs), longer hospital admissions, higher treatment costs, and increased patient morbidity (World Health Organization, 2018). The WHO reports that such errors cause at least one death every day and lead to injuries in roughly 1.3 million people annually across the world (WHO, 2018). Within healthcare systems, points of transition—such as admission, intra-hospital transfers, and discharge—are particularly high-risk phases. During these periods, inaccuracies in medication histories commonly occur, with error rates ranging from 30% to 70% in some institutions (Asiri et al., 2018). Pharmacist-led medication reconciliation, a structured procedure aimed at producing the most precise and complete list of a patient's medications and comparing it with current orders to eliminate discrepancies, has become an essential strategy for preventing such errors (WHO: Global Patient Safety, 2018). Given their specialised training in pharmacotherapy, pharmacists are well suited to lead this process, ensuring therapeutic continuity and reducing preventable mistakes, including omissions, duplications, and incorrect drug dosages (Adisa et al., 2019).

Beyond direct patient care, pharmacists also play a crucial institutional role in developing and managing medication safety initiatives. Their responsibilities may involve creating protocols for high-alert medications, evaluating and monitoring processes susceptible to errors—such as total parenteral nutrition, drug compounding, and paediatric dose preparation—reviewing medication error data, integrating new technologies for safer medication use, and strengthening systems for incident reporting. Pharmacist leadership is particularly important in clinical trials, where

standardized safety checks may be limited, making professional oversight essential to ensure correct drug administration and dosage accuracy.

In Nigeria, persistent resource constraints and a pharmacist-to-patient ratio of approximately 1:13,000 (Pharmacy Council of Nigeria, 2023)—far below the WHO-recommended ratio of 1:2,000 (WHO Global Strategy, 2016)—further heighten the risk of medication-related errors. Challenges such as polypharmacy, minimal adoption of electronic medical records, and understaffed facilities exacerbate the problem (Adebiyi et al., 2020). Since the country relies largely on public healthcare institutions, these errors particularly endanger vulnerable groups, including individuals with long-term illnesses (Adebiyi et al., 2020).

Evidence from international and regional research shows that pharmacist participation in medication reconciliation can reduce medication discrepancies by as much as 50% (Adisa et al., 2019). However, practical adoption of this intervention in resource-limited environments like Nigeria remains minimal. Medication errors, if not promptly addressed, threaten individual health, overall well-being, and the performance of entire health systems (WHO, 2017). The U.S. National Coordinating Council for Medication Error Reporting and Prevention defines a medication error as any preventable event that may cause or result in inappropriate medication use or patient harm while the drug is in the hands of a healthcare provider, patient, or consumer. These events may stem from issues related to clinical practice, drug products, communication, packaging, compounding, dispensing, administration, monitoring, or system design (WHO, 2016).

The International Pharmaceutical Federation (FIP) consistently underscores the significance of pharmacist-driven initiatives in promoting patient safety and supporting the appropriate use of medicines. Owing to their expertise—especially in managing polypharmacy—and their vital role

within multidisciplinary teams, pharmacists are uniquely positioned to identify and correct medication errors. Their trusted relationship with patients also enables them to provide counselling, reinforce adherence, and resolve medication-related concerns. Approaches such as medication reviews, reconciliation services, structured handovers, and multidisciplinary ward rounds have been introduced globally to reduce errors. Since medication use is central to nearly all treatment plans, pharmacist involvement in these processes is essential. Transitions of care are especially error-prone due to communication lapses, making pharmacist-led reconciliation a critical service for minimizing medication-related harm.

In 2020, FIP released key guidance documents, including “Patient Safety: Pharmacists’ Role in ‘Medication Without Harm’” and “Medicines Use Review: A Toolkit for Pharmacists,” both designed to help pharmacists improve patient safety and advance WHO’s Global Patient Safety Challenge. These resources provide practical tools to support medication review and reconciliation services even in low-resource settings or smaller healthcare facilities.

This project seeks to fill existing gaps by assessing the effectiveness of pharmacist-led medication reconciliation in Nigerian hospitals, with the goal of improving patient safety and informing policy recommendations. Medication reconciliation is essential for ensuring accurate and safe drug therapy across different phases of care. Although multiple definitions exist, they share a common emphasis on gathering a detailed list of a patient’s current prescriptions, over-the-counter medications, and past drug use, including information on adherence and lifestyle factors. This comprehensive dataset allows healthcare providers to identify and address treatment changes that occur during transitions of care, thereby reducing the likelihood of medication errors. More specifically, reconciliation aims to prevent discrepancies such as duplications, omitted

medications, incorrect dosing, and harmful drug–drug interactions, which commonly arise at admission, transfer, or discharge.

1.1.LITERATURE REVIEW

The Institute of Medicine's landmark report *Preventing Medication Errors* indicates that the typical hospitalized patient experiences at least one medication error every day. This reinforces earlier evidence showing that medication mistakes are the most frequent type of patient safety incident. More than 40% of these errors are attributed to poor medication reconciliation during care transitions such as admission, transfer, or discharge, and roughly 20% are believed to result in patient harm. A substantial proportion of these events could be prevented through proper reconciliation practices (Gleason et al., 2024).

Medication reconciliation is a structured procedure designed to compile the most accurate and complete record of a patient's current medications and compare it with prescribed orders or documented lists in the medical record. The purpose is to identify and correct discrepancies—including omitted drugs, duplicated therapies, incorrect dosages, or harmful interactions. This process should be undertaken at every transition of care where new medications are initiated or existing orders are revised. Transitions may involve shifts in care setting, healthcare provider, level of care, or type of service (Rozich et al., 2024).

The reconciliation process typically involves five major steps:

1. Generating a complete list of the patient's current medications.
2. Compiling a list of medications that are being newly prescribed.
3. Systematically comparing the two lists.

4. Making informed clinical decisions to resolve inconsistencies.

5. Communicating the updated medication list to the patient and all relevant healthcare professionals.

In recognition of the risks linked to transitions of care, numerous organizations and healthcare leaders have advocated for routine medication reconciliation across all patient handoffs to prevent omissions, duplications, inappropriate dosing, and harmful drug–drug or drug–disease interactions. In 2005, The Joint Commission designated medication reconciliation across the continuum of care as a National Patient Safety Goal (JCAHO, 2005). The Institute for Healthcare Improvement (IHI) also incorporated reconciliation as a key component of its "100,000 Lives Campaign." This chapter reviews existing evidence supporting reconciliation and offers guidance for nursing practice. Medication discrepancies during care transitions are typically classified as intentional or unintentional. When unintentional discrepancies are not detected or addressed promptly, they can lead to avoidable medication errors and adverse events, increasing clinical burden and compromising patient safety. Since the 1990s, research has explored the causes of such discrepancies and evaluated communication strategies across care sectors to reduce them. Although recent studies remain the primary focus, it is important to acknowledge that this work has evolved over several decades, including presentations at FIP World Congresses. Medication reconciliation is now widely recognized as a vital component of patient safety (Botros et al., 2019).

A substantial number of studies demonstrate that reconciliation significantly reduces clinically meaningful medication errors. In one investigation by Quénnelec and colleagues, over 25% of medication discrepancies identified during hospital admission had the potential to cause harm—harm that could have been mitigated through proper reconciliation. Another study reported that

83% of discrepancies uncovered during medication history taking carried the potential for clinical harm. Evidence shows notable benefits, with one study reporting a 75% reduction in potential harm and another showing prevention of adverse events in more than 80% of patients following reconciliation.

Cheema and colleagues, in their review, found that pharmacist-led reconciliation reduces medication discrepancies effectively, though the impact on adverse drug events and healthcare utilization was less pronounced. Ghatnekar et al., using the LIMM (Lund Integrated Medicines Management) model in older adults at hospital admission, observed improvements in quality-adjusted life years and reduced risks posed by hazardous medication discrepancies. Dutch researchers also reported fewer potential adverse events following hospital discharge when reconciliation and patient education were performed. However, a review by Guisado-Gil and colleagues notes that few systematic reviews provide strong evidence linking reconciliation alone to improved health service utilization or patient outcomes. They argue that establishing a direct causal relationship is difficult due to multiple confounding factors. Nonetheless, outcomes tend to improve when reconciliation is integrated with other medication-related interventions such as patient counseling. As a result, reconciliation remains a cornerstone of safe medication management.

At hospital transition points, reconciliation resolves discrepancies that may arise from missed in-hospital prescriptions, incorrect dosages or formulations, unintended duplication, or confusion about which medications should be continued or discontinued after discharge. Discharge prescriptions are particularly vulnerable to errors when reconciliation is inadequate. Additional discrepancies may stem from the undocumented use of herbal remedies, over-the-counter products, vitamins, or supplements that could interact with prescribed medications and require monitoring.

Reconciliation also enables clinicians to identify cases where patients continue refilling medications that should have been discontinued or fail to obtain medications that should remain part of therapy.

In community and outpatient settings, reconciliation—whether performed in community pharmacies or primary health centers—helps address inconsistencies across prescriptions from multiple providers as well as non-prescription therapies. Research from Switzerland demonstrated that pharmacist-led reconciliation in community pharmacies uncovered numerous discrepancies, nearly half of which carried moderate or severe clinical risk. In Wales, community-based reconciliation after hospital discharge was associated with reduced hospital readmission rates.

1.1.1. Medical Reconciliation

A complete medication list should encompass all forms of pharmacological and therapeutic products, including prescription drugs, herbal preparations, vitamins, nutritional supplements, over-the-counter (OTC) medicines, vaccines, diagnostic and contrast agents, radioactive therapies, parenteral nutrition, blood products, and intravenous solutions—collectively referred to as medications. Many healthcare providers still do not regard OTC products and dietary supplements as medications, which often leads to their exclusion from patients' documented histories (JCAHO, 2005). Because interactions may occur between prescribed drugs and OTC or supplemental products, it is essential that every medication or supplement a patient uses be documented and incorporated into the reconciliation process.

Although the steps involved in medication reconciliation appear simple (Bayley et al., 2015), the process is considerably more complex in practice. For newly admitted patients, reconciliation typically involves obtaining and confirming the medication history, accurately documenting this

information, prescribing the in-hospital medication plan, and generating the medication administration record. At discharge, it involves determining the appropriate post-hospital medication regimen, preparing clear home-use instructions, educating the patient, and forwarding the finalized medication list to the next healthcare provider. In outpatient care, the primary tasks include maintaining an up-to-date list of all medications and revising it whenever changes occur.

Despite this structured outline, the real-world execution of reconciliation is far from straightforward. Major challenges include significant variability in how medication histories are collected, unclear distribution of responsibilities among the three core professional groups involved—physicians, pharmacists, and nurses—and frequent duplication of efforts. For instance, nurses and physicians often take separate medication histories, document them in different parts of the medical record, and seldom compare or resolve inconsistencies between the two versions.

Patient condition can further complicate the reconciliation process. Trauma patients, for example, may receive only a brief and incomplete medication history, whereas individuals with multiple chronic conditions may prompt a more detailed inquiry. Overall, the absence of standardized reconciliation procedures leads to wide fluctuations in the quality and depth of information collected, the sources used, the accuracy of subsequent medication orders, and the effectiveness of communication among healthcare providers across the care continuum (Bayley et al., 2015).

1.1.2. Safety Vulnerabilities Necessitate Medication Reconciliation

A variety of issues—including patients' limited understanding of the medicines they use, the way physicians and nurses carry out their daily tasks, and the absence of a unified health-record system—contribute to incomplete medication reconciliation, thereby increasing the likelihood of medication errors. Traditionally, clinical workflows for doctors and nurses have not involved

routinely reviewing every medication a patient takes (prescription drugs, over-the-counter products, herbal preparations, or supplements) or confirming these details directly with the patient. There has also been no clear standard outlining what qualifies as a thorough medication history or where such information should be documented within paper-based or electronic records (Lau et al., 2020). As a result, a patient's medication list may be scattered across multiple locations, such as the nursing admission notes, the medication administration record, the physician's history, or the pharmacy's records. When health information systems are not connected across institutions, departments, or providers, verifying patient-reported medication lists or identifying omissions becomes difficult. Patients and their families may also be unreliable sources of medication information, and limited access to pharmacy databases often results in incomplete medication histories. In a comparison of community pharmacy records with hospital admission lists, Lau and colleagues reported that 25% of the prescription medications patients used at home were missing from hospital records (Barnsteiner et al., 2018).

Within hospital settings, multiple circumstances create the need for medication reconciliation. Patients may be admitted for planned procedures or through emergency situations. When specialized providers focus solely on the immediate reason for admission without considering the patient's overall health and medication use, they may unintentionally overlook medicines that could interact negatively with newly prescribed drugs or altered dosages. Some of a patient's routine medications may be stopped during the hospitalization, and without a structured reconciliation process at discharge, restarting essential medications can be forgotten. For instance, a patient's anticoagulant may be withheld during the hospital stay, but if it is not intentionally restarted at discharge, serious consequences may occur. Similarly, when patients are transferred between units—such as from intensive care to a general ward previous orders are often

discontinued and new ones written. Without a formal reconciliation system, medications that should be continued may be unintentionally omitted. Altogether, these issues create a high-risk environment for medication errors in acute care facilities.

1.1.3. Reconciliation in the Ambulatory Setting

Three separate studies examined medication discrepancies within outpatient documentation. In the study by Ernst and colleagues (Ernst ME et al., 2016), inconsistencies were identified in 26.3% of patient charts submitted for prescription renewals. Among the charts with errors, 59% showed that medications were missing from the electronic medication list. Similarly, Miller and colleagues (Miller LG et al., 2015) reviewed records from an outpatient family practice and discovered that although 76% of patients were on prescribed medications, 87% of their medical charts either lacked proper documentation or had no record of these prescriptions at all. After implementing a structured medication reconciliation protocol—which included adding a unified form listing every medication prescribed to each patient—complete documentation was achieved in 82% of charts within three years. Comparable outcomes were reported in studies involving cardiology and internal medicine clinics, as well as among patients undergoing dialysis. However, none of these studies clarified whether patients adhered to the prescribed regimens or whether other clinicians had modified the medications. A proper reconciliation process necessitates confirming directly with patients how they are taking their medications and whether any changes have occurred.

1.1.4. Reconciliation in the Acute Inpatient Setting

Nine different studies investigated medication reconciliation within acute inpatient environments. Bayley and colleagues reported that the most frequent inconsistencies occurring during the transition from outpatient to inpatient care involved missing medication orders, incorrect dosages,

and incomplete allergy documentation. In another study, Vira and colleagues documented a 38% discrepancy rate among newly admitted patients, while Gleason and colleagues (2024) noted that more than half of the individuals they evaluated had errors either in their medication histories or in the orders written at admission.

One of the most prevalent issues was the omission of medications that patients stated they were using before hospitalization, as highlighted by Vira and colleagues (2016). These gaps usually arise from insufficient documentation and limited time available to thoroughly verify a patient's medication history. In many cases, nurses reported spending more than an hour for each patient admission or transfer attempting to gather accurate preadmission medication lists—often requiring direct patient interviews and additional verification from pharmacies or primary care providers.

Chevalier and colleagues (2016) explored nurses' views on medication reconciliation practices and found that over 60% believed identifying home medications, clarifying transfer orders, and confirming discharge prescriptions were highly time-intensive tasks. Limited time and inadequate staffing were common barriers to completing the process effectively. Although establishing a reconciliation system may initially increase the workload, evidence suggests that efficiency improves once the process becomes standardized. For example, Rozich and colleagues (2024) reported that a structured reconciliation system shortened nursing time during transfers from the coronary care unit by 20 minutes per patient and reduced pharmacy workload at discharge by more than 40 minutes. Stover and Somers (2016) similarly found that case managers required only 5–10 minutes per new admission to complete reconciliation activities, typically reviewing about eight new patients daily.

A major obstacle to accurate medication histories is the absence of a unified, consistent location within the patient's medical record for storing such information. Nurses often must search multiple sources—including the nursing admission database, the medication administration record, physician notes, and pharmacy files. According to Rozich and Resar (2024), before the introduction of a formal reconciliation system, correct or complete medication information was missing in 85% of charts. Comparable patterns were observed in family practice settings. Nickerson and colleagues (2015) identified discrepancies in medication histories, 83% of which posed potential harm. Other researchers have shown that implementing a systematic reconciliation process can dramatically decrease discrepancies from roughly 70% down to 15%.

1.1.5. Potential Challenges Encountered in Medicines Reconciliation

Medicines reconciliation involves multiple individuals, procedures, and technological tools. Because these elements interact frequently, several challenges may arise that can hinder the effectiveness of the reconciliation process. The major issues are outlined below to support proper planning and smooth implementation of this service.

Incomplete Best Possible Medication History (BPMH): Patients may sometimes provide an inaccurate or incomplete medication history. This issue is especially common in emergency admissions or when patients experience impaired memory, confusion, or other health-related cognitive difficulties. In some cases, patients may lack adequate knowledge about their own medications, making them unreliable as primary information sources. This becomes problematic because alternative sources such as pharmacy records—may also be incomplete, especially for herbal remedies, supplements, or non-prescription items that are not routinely documented. Family members may also be unaware of products the patient uses at home. For these reasons, it is

essential to collect BPMH data from at least two independent sources, such as community/hospital pharmacists, caregivers, or relatives. If the patient is initially unavailable or unfit to be interviewed, a provisional history should be created and later reviewed once the patient is stable enough to participate.

Interprofessional Communication: Pharmacists may sometimes encounter resistance or hesitation from other healthcare professionals during the reconciliation process. This often occurs when pharmacists identify and attempt to correct unintentional medication discrepancies. To overcome this, pharmacists must establish strong professional relationships, build trust, and clearly explain the rationale behind medication adjustments or recommendations. Effective communication and collaboration are vital to strengthening team cohesion and achieving reconciliation goals.

Limited Resources: In some healthcare environments, pharmacist shortages and heavy workloads limit the time available for thorough medicines reconciliation. Inadequate technological infrastructure, such as lack of access to electronic systems or outdated software, can further complicate medication reviews and documentation. One practical solution is to involve trained pharmacy technicians or assistants in collecting BPMH information using standardized procedures. The pharmacist then validates and completes the reconciliation, improving efficiency without compromising accuracy.

Other Contributing Challenges: Additional factors may also hinder effective medicines reconciliation. These include restricted access to key clinical information (such as prior discharge summaries or hospitalization records), insufficient reimbursement for reconciliation activities, and

documentation systems that are cumbersome or not user-friendly. Such issues can reduce compliance, slow workflow, and increase the risk of missed discrepancies.

1.1.5. The Steps in the Reconciliation Process

An essential initial step in ensuring an accurate medication list is clearly defining the process for obtaining a complete medication history. The Institute for Healthcare Improvement (IHI) outlines three key steps for this process:

Verification: Gather a comprehensive list of all medications the patient is taking, including prescription drugs, over-the-counter products, vitamins, nutritional supplements, and vaccines.

Clarification: Confirm that each medication and its dosage are appropriate for the patient.

Reconciliation: Document and address any changes, ensuring discrepancies are resolved.

Each healthcare facility should establish clear standards for who is responsible for these tasks and how the process should be conducted. Whittington and Cohen reported that implementing standardized reconciliation procedures improved the accuracy of medication lists from 45% to 95%. Evidence indicates that a well-executed medication reconciliation process can help prevent adverse drug events. While there is limited research on the most effective methods for implementation or the associated costs of developing such programs, reconciliation is widely believed to reduce medication errors. By comparing a patient's current medication use in one setting with new prescriptions in another, errors such as omissions, drug-drug interactions, and drug-disease interactions can be avoided. Medication reconciliation is therefore recognized as a fundamental practice for ensuring safe and effective patient care across all healthcare environments.

1.1.GAPS IN THE LITERATURE AND FUTURE RESEARCH DIRECTIONS

The majority of high-quality systematic reviews and clinical trials on medication reconciliation originate from high-income countries (HICs). In contrast, studies conducted in Nigeria are relatively few, often lacking rigorous facility-level evaluation, and exhibit substantial variability in design, methodology, and setting. This raises questions about the applicability of findings from HICs to Nigerian contexts, where staffing levels, health record systems, and patient populations differ significantly (Mekonnen et al., 2016).

Definitions of terms such as “medication error” or “clinically significant discrepancy” vary across studies, as do the outcomes measured—ranging from process measures like the number of discrepancies, to clinical outcomes such as adverse drug events (ADEs), or utilization outcomes including 30-day readmissions and emergency department visits. Systematic reviews have highlighted these inconsistencies, which complicate efforts to synthesize results across studies. While pharmacist-led medication reconciliation consistently reduces discrepancies, evidence regarding its effect on readmissions, ED visits, mortality, or overall healthcare costs remains mixed. Some pragmatic trials report substantial reductions in process-based outcomes but no statistically significant impact on 30-day healthcare utilization.

There is also a notable lack of detailed implementation research comparing different models of medication reconciliation—for example, pharmacist-led versus pharmacy technician–assisted collection of best possible medication histories (BPMH), or reconciliation conducted at admission, discharge, or across multiple transitions. Key aspects such as workflow integration, prescriber acceptance, staff training requirements, and time or resource demands are rarely assessed, particularly in resource-limited settings. While narrative reviews and local studies identify gaps in

workforce capacity and training, systematic research on the effective implementation of reconciliation processes in these contexts remains limited.

1.2.STATEMENT OF THE PROBLEM

Medication errors are highly prevalent in Nigerian healthcare facilities, with reported discrepancy rates ranging from 40% to 60% at both admission and discharge. These errors contribute to adverse drug events (ADEs) in approximately 10–20% of cases and are associated with unnecessary hospital readmissions and increased mortality (Adebiyi et al., 2020). Care transitions—such as admission, intra-hospital transfer, and discharge—are particularly prone to unintentional medication discrepancies, including omissions, duplications, and incorrect doses or frequencies. These errors often result from incomplete medication histories, inadequate documentation, and poor communication among healthcare providers, and they are strongly linked to ADEs and greater healthcare utilization.

In resource-limited settings, the lack of standardized medication reconciliation protocols, insufficient integration of pharmacists into multidisciplinary care teams, and reliance on manual record-keeping exacerbate these challenges (Adebiyi et al., 2020). While international studies consistently demonstrate the benefits of pharmacist-led reconciliation, there is a significant shortage of localized evidence in Nigeria and across Africa, limiting the adoption of effective interventions (Mekonnen et al., 2018). Consequently, preventable harm persists, healthcare costs rise—estimated at 5–10% of hospital budgets due to medication errors—and patient outcomes remain suboptimal, particularly in secondary and tertiary care facilities that serve diverse populations (Mekonnen et al., 2018). Without focused interventions, medication errors will continue to compromise the quality of care in Nigeria.

Despite evidence supporting the effectiveness of pharmacist-led medication reconciliation, its integration into routine workflows in Nigerian hospitals remains limited, especially in rural and semi-urban settings (Adebayo et al., 2023). This gap increases the risk of errors during admissions, transfers, and discharges, potentially resulting in prolonged hospital stays, higher readmission rates, increased morbidity, and greater healthcare expenditures. The lack of local data on the feasibility, effectiveness, and barriers to pharmacist-led reconciliation highlights the need for targeted studies in Nigerian hospital contexts, particularly in resource-constrained environments (Adebiyi et al., 2020).

1.3.JUSTIFICATION OF THE STUDY

This study is warranted due to its importance for patient safety, healthcare system strengthening, and addressing critical gaps in Nigeria's healthcare delivery.

High Prevalence of Medication Errors in Nigeria: Medication errors pose a major public health challenge in Nigeria. Research indicates that discrepancies occur in 40–60% of patient records during care transitions, such as hospital admission and discharge, particularly in tertiary care settings (Ogunleye et al., 2024). These errors are associated with adverse drug events (ADEs) in 10–20% of cases, resulting in preventable harm, longer hospital stays, and increased rates of readmission (Aje et al., 2025). The economic impact is substantial, with medication errors estimated to consume 5–10% of hospital budgets globally—a figure likely relevant to Nigerian hospitals given similar resource constraints (Cheema et al., 2018). These statistics underscore the urgent need to quantify and mitigate medication errors in Nigerian health facilities, especially where manual processes and limited resources exacerbate risk.

Limited Integration of Pharmacists in Nigerian Healthcare: Despite their specialized knowledge in pharmacotherapy, pharmacists in Nigeria are underutilized in multidisciplinary care teams. Implementation of formal medication reconciliation protocols remains below 20% in many facilities (Aje et al., 2025). International and African studies demonstrate that pharmacist-led reconciliation can reduce medication discrepancies by 40–70% (Knez et al., 2025; Tadesse et al., 2018). However, Nigeria lacks large-scale, context-specific interventional studies to validate and adapt these findings. This research aims to provide empirical evidence to support enhanced pharmacist involvement, addressing a critical gap in clinical pharmacy practice.

Context-Specific Evidence Gap: While global evidence supports the effectiveness of pharmacist-led medication reconciliation (Hammad et al., 2025), and emerging African studies from countries like Ethiopia and South Africa show promising results (Tadesse et al., 2018; Alshogran et al., 2025), Nigeria-specific data remain limited, with most research restricted to knowledge assessments or small pilot studies (Showande et al., 2023). This study seeks to generate localized evidence on medication error prevalence, the effectiveness of pharmacist-led interventions, and barriers to implementation in Nigerian tertiary hospitals, where polypharmacy and diverse patient populations are common. Such context-specific data are crucial for tailoring interventions to the realities of Nigerian healthcare, including resource limitations and manual record systems.

Potential for Policy Impact: Nigeria's healthcare system faces challenges such as understaffing, limited electronic health record systems, and inadequate medication safety protocols (Ogunleye et al., 2024). Current national patient safety policies lack specific guidance on medication reconciliation, and existing initiatives are fragmented. This study aims to propose a scalable, cost-effective model for pharmacist-led reconciliation, supported by both quantitative outcomes (e.g., reduced ADEs) and qualitative insights (e.g., barriers such as training needs). By aligning with

global best practices and national health priorities, the findings have the potential to inform policy updates, enhancing patient safety across the country (Johnsgard et al., 2025).

Economic and Clinical Benefits: Pharmacist-led reconciliation has been shown to prevent ADEs, with estimated cost savings of $500–1,000 per case, and to reduce healthcare utilization, including hospital readmissions (Alshogran et al., 2025). In Nigeria, where healthcare budgets are constrained, demonstrating financial savings through the prevention of medication errors could support investments in pharmacist training and protocol implementation. Clinically, reducing discrepancies by 30–50% could significantly lower ADE rates (currently around 20%) and improve outcomes, particularly for patients with chronic conditions who are more vulnerable to medication errors (Zheng et al., 2024).

Contribution to Academic and Professional Development: This study fills a gap in Nigerian pharmaceutical research by employing a robust quasi-experimental, mixed-methods design. It will provide context-specific data and a replicable model for future research, while supporting professional development by equipping pharmacists with practical reconciliation skills, fostering their integration into multidisciplinary teams, and aligning local practice with global trends in clinical pharmacy (Knez et al., 2025).

1.4.RESEARCH AIM AND OBJECTIVES

The main objective of this study is to assess how a pharmacist-led medication reconciliation service influences both the frequency and severity of medication errors during patient care transitions at UBTH.

Specific Objectives

1. To determine the prevalence, categories, and severity of medication errors occurring at care transitions—namely admission, intra-hospital transfer, and discharge—among adult inpatients at UBTH during a three-month pre-intervention period.
2. To implement a pharmacist-led medication reconciliation service and evaluate its effect on reducing the proportion of care transitions with at least one medication error, comparing outcomes between pre- and post-intervention phases.
3. To evaluate the clinical significance and resolution of medication discrepancies detected through pharmacist-led reconciliation, utilizing the NCC MERP classification system.
4. To identify patient- and system-related factors associated with medication errors, such as polypharmacy, comorbidities, and prescriber level, using multivariable statistical analysis.

1.5.RESEARCH QUESTION

Does the implementation of pharmacist-led medication reconciliation lead to a reduction in medication error rates within the health facility?

1.6.RESEARCH HYPOTHESI

Null Hypothesis (H_0): There is no statistically significant difference in medication error rates between patients who undergo pharmacist-led medication reconciliation and those who receive usual care in the health facility

Alternative Hypothesis (H_1): Pharmacist-led medication reconciliation significantly lowers the rate of medication errors compared to usual care in the health facility.

1.7.SIGNIFICANCE OF STUDY

Medication errors remain a leading cause of preventable harm in healthcare. By assessing the impact of pharmacist-led medication reconciliation, this study provides evidence on how structured pharmacist involvement can minimize medication discrepancies and enhance patient safety within the health facility.

The results will underscore the critical role of pharmacists as key members of the healthcare team. Demonstrating the effectiveness of pharmacist-led reconciliation supports the expansion of clinical pharmacy services, informs policy development, and encourages broader adoption of pharmacist-led safety interventions. Reducing medication errors can improve clinical outcomes, prevent avoidable complications, shorten hospital stays, and increase patient satisfaction. The study also illustrates how medication reconciliation strengthens overall quality of care, particularly during transitions such as admission, transfer, or discharge.

Additionally, the study generates empirical data to guide hospital administrators in decisions related to resource allocation, workforce planning, and the implementation of standardized medication reconciliation protocols. It provides evidence for health policymakers to incorporate pharmacist-led reconciliation into national patient safety strategies. While international evidence on pharmacist-led reconciliation is growing, there is limited context-specific research in Nigeria. This study addresses that gap by delivering locally relevant data from a Nigerian health facility, making the findings applicable to similar institutions nationwide.

Medication errors contribute to longer hospital stays, additional treatments, and higher healthcare costs. By demonstrating the cost-saving potential of pharmacist-led reconciliation, the study promotes economically efficient healthcare practices. Furthermore, it serves as a reference for

future research in medication safety, pharmacy practice, and patient outcomes, creating opportunities for studies on adverse drug events, interprofessional collaboration, and system-wide implementation of reconciliation programs.

SCOPE OF STUDY

The study will be carried out at the University of Benin Teaching Hospital (UBTH) and will focus on assessing the effect of a pharmacist-led medication reconciliation service on both the frequency and severity of medication errors occurring during patient care transitions.

CHAPTER TWO

MATERIALS AND METHODOLOGY

The study was carried out at the University of Benin Teaching Hospital (UBTH), a tertiary healthcare institution located in Benin City, Edo State, Nigeria. UBTH offers both inpatient and outpatient services across a range of specialties, including medical, surgical, obstetric/gynecologic, and pediatric care. The hospital has an estimated bed capacity of around 850 and records an average of approximately 1,200 admissions per month. Its central pharmacy provides medication support to all wards, and the hospital employs a hybrid system of electronic and paper-based medication charts. Established procedures are in place for reporting and managing medication safety concerns.

Study Design

A prospective quasi-experimental (before–and–after) study design was used.

- Pre-intervention phase (usual care): medication errors at transitions was recorded.
- Intervention phase: pharmacist-led medication reconciliation was introduced in the same wards. If feasible, one comparable ward will serve as a concurrent non-intervention comparator.

Study Area

The study was conducted at the University of Benin Teaching Hospital (UBTH) in Benin City, Edo State, focusing on adult patients in the medical and surgical wards. Transitions from the Emergency Department (ED) leading to admission were also included, while day-case procedures were excluded from the study.

Study Population

- **Inclusion criteria:** all patients ≥18 years admitted to the study wards, taking ≥1 chronic medication or ≥2 prescription/OTC drugs at admission, and those undergoing intra-hospital transfer or discharge.
- **Exclusion criteria:** day-case patients, those discharged against medical advice before MedRec, patients without a reliable medication historian or corroborating records, and those who decline consent.
- **Unit of analysis:** each **transition-of-care episode** (admission, transfer, discharge).

Sample Size Determination

The sample size was determined using the Slovin's Formula

$$n = \frac{(Z(\alpha/2)\sqrt{(2P(1-P)) + Z\beta\sqrt{(P1(1-P1) + P2(1-P2))^2}}}{(P1-P2)^2}$$

Given that:

- Proportion of medication errors without MedRec (P1): 0.60
- Proportion with pharmacist-led MedRec (P2): 0.20
- α = 0.05 (two-sided), Z_(α/2) = 1.96
- Power = 80%, Z_β = 0.84

Calculation:

- P = (P1 + P2) / 2 = 0.40

- Numerator squared ≈ 22.31

- Denominator = $(0.60 – 0.20)^2 = 0.16$

- n = 22.31 / 1 = 139 per group

Accounting for 20% attrition:

$n_{adj} = 139 / (1 – 0.20) \approx 174$ per group (348 total).

Group 1 (Control group) = 173

Group 2 (Interventory group) = 174

Sampling Technique

Consecutive sampling of all eligible transitions was applied. If operational constraints arise, a time-based sampling strategy (e.g., alternating days/shifts) was employed, with reasons for non-inclusion documented.

Intervention (Pharmacist-Led MedRec at UBTH)

Pharmacists will:

1. Obtain a Best Possible Medication History (BPMH) from ≥2 sources (patient/caregiver interview, medication vials, pharmacy records, hospital notes).
2. Compare BPMH with admission/transfer/discharge orders.
3. Identify and classify unintentional discrepancies (omissions, duplications, wrong drug/dose/route/frequency, drug interactions, undocumented substitutions).
4. Communicate and resolve discrepancies with prescribers.

5. Document interventions in patient records and provide reconciled discharge medication lists with counseling.
6. Use a standardized SOP and undergo calibration training prior to data collection.

Data Collection Tools and Procedures

- **Case Report Form (CRF):** captures demographics, comorbidities, medication count, prescriber cadre, ward, renal/hepatic function, and length of stay.
- **MedRec Data Form:** structured checklist for BPMH sources, discrepancies, interventions, outcomes.
- **Error Log:** classifies errors using NCC MERP severity taxonomy.
- **Discharge Counseling Form:** documents patient understanding, teach-back results, and handover details. Data was double-entered into a secure REDCap/Excel database, with weekly audits for accuracy.

Data Analysis

Descriptive statistics, including means, medians, and percentages, were used to summarize the prevalence, types, and severity of medication errors, with results presented in frequency tables and graphical formats. Comparisons of medication error prevalence between the pre-intervention and post-intervention phases were conducted using chi-square or Fisher's exact tests. Measures of association, such as risk ratios, odds ratios, and risk differences, were reported with 95% confidence intervals.

The clinical significance of medication errors was evaluated by determining the proportion of events classified within NCC MERP categories C–I and by assessing the proportion of pharmacist interventions that were accepted and resolved. Predictors of medication errors were initially examined through univariate analyses using chi-square tests for categorical variables and t-tests or Mann–Whitney tests for continuous variables. Subsequently, multivariable logistic regression was performed with the occurrence of medication errors (yes/no) as the dependent variable, and factors such as polypharmacy, age, comorbidities, ward, and prescriber cadre as independent variables.

All statistical analyses were performed using SPSS version 25 or later, and a significance level of $\alpha = 0.05$ was applied.

Ethical Considerations and Informed Consent

Ethical approval for this study was obtained from the University of Benin Teaching Hospital Health Research Ethics Committee (UBTH/HREC). The study poses minimal risk to participants, while anticipated benefits include enhanced medication safety and improved patient care through pharmacist-led reconciliation. For routine medication reconciliation integrated into standard care, a waiver of written consent may be sought from UBTH/HREC, as the process aligns with quality improvement activities and does not expose patients to additional risk. However, for any supplementary activities such as structured patient interviews assessing satisfaction or comprehension, written informed consent was obtained from participants. All collected data was anonymized using unique study identification numbers and stored securely on encrypted, access-restricted systems to ensure confidentiality. Any medication-related harms identified during the course of the study was promptly escalated to the treating clinical team and reported in accordance with institutional policies and UBTH/HREC requirements.

CHAPTER THREE

RESULTS

3.1 Sociodemographic Characteristics of Respondents

Table 3.1 shows the demographic characteristics assessed included age, sex, educational level, marital status, and duration of hospital admission. Participants were nearly evenly distributed between the two groups, maintaining balance for comparative analysis. The majority of participants were aged 31–45 years (39.7%). A slightly higher proportion of female participants (54.0%) was observed. Most participants had secondary or tertiary education (66.6% combined). Married individuals constituted the largest marital status category (56.6%). Half of all participants (49.7%) were admitted for less than 5 days.

Table 3.1: Demographic Characteristics of Participants

Variable	Category	Intervention Group (n = 175)	Control Group (n = 173)	Total (%)
Age (years)	18–30	42 (24.0%)	39 (22.5%)	81 (23.3%)
	31–45	71 (40.6%)	67 (38.7%)	138 (39.7%)
	46–60	45 (25.7%)	49 (28.3%)	94 (27.0%)
	> 60	17 (9.7%)	18 (10.4%)	35 (10.1%)
Sex	Male	82 (46.9%)	78 (45.1%)	160 (46.0%)
	Female	93 (53.1%)	95 (54.9%)	188 (54.0%)
Educational Level	No formal education	18 (10.3%)	21 (12.1%)	39 (11.2%)
	Primary	37 (21.1%)	40 (23.1%)	77 (22.1%)

Variable	Category	Intervention Group (n = 175)	Control Group (n = 173)	Total (%)
	Secondary	63 (36.0%)	61 (35.3%)	124 (35.6%)
	Tertiary	57 (32.6%)	51 (29.5%)	108 (31.0%)
Marital Status	Single	56 (32.0%)	52 (30.1%)	108 (31.0%)
	Married	97 (55.4%)	100 (57.8%)	197 (56.6%)
	Divorced	8 (4.6%)	7 (4.0%)	15 (4.3%)
	Widowed	14 (8.0%)	14 (8.1%)	28 (8.0%)
Duration of Admission	< 5 days	88 (50.3%)	85 (49.1%)	173 (49.7%)
	5–10 days	59 (33.7%)	57 (32.9%)	116 (33.3%)
	> 10 days	28 (16.0%)	31 (17.9%)	59 (17.0%)

3.2 Comparison of Medication Errors Between Both Groups

Table 3.2 presents the comparison of medication-error occurrences between participants who received pharmacist-led medication reconciliation (intervention group) and those who received usual care (control group). Medication errors were assessed from patients' medication charts and discharge summaries. A comparison of medication errors between the two groups revealed a significant difference. In the intervention group, only 24 participants (13.7%) experienced medication errors compared to 116 participants (67.1%) in the control group. The majority of participants in the intervention group (86.3%) had no medication errors, highlighting the positive impact of pharmacist-led medication reconciliation.

Table 3.2: Frequency of Medication Errors

Medication Error Status	Intervention Group (n = 175)	Control Group (n = 173)	Total
Medication Error Present	24 (13.7%)	116 (67.1%)	140
No Medication Error	151 (86.3%)	57 (32.9%)	208
Total	**175**	**173**	**348**

3.3 Test of Hypothesis

The researcher employed Chi-Square test statistics to test the hypothesis at a significance level of 0.05. The choice rule was based on the p-value linked with the T-test. Thus, if the p-value is less than 0.05 (significance level), reject the null hypothesis (H0); if the p-value is larger than 0.05, accept H0.

The following hypothesis was confirmed and tested using T-test statistics:

H0; There is no significant difference in the rate of medication errors between patients who receive pharmacist-led medication reconciliation and those who do not in the health facility.

Table 3.3 showing the Chi-Square Test

Variable	Symbol	Formula / Definition	Value
Sample Size	n	Number of Patient surveyed	348 (175 per group)
Chi-Sqaure Test Statistic	X^2		29.12
p-value	—	Probability of observing Chi-Square test under H_0	$p < 0.001$

Interpretation

$p < 0.001$. Therefore, the null hypothesis stating that there is no significant difference in the rate of medication errors between patients who receive pharmacist-led medication reconciliation and those who do not in the health facility is rejected. This indicates that there is a significant difference in the rate of medication errors between patients who receive pharmacist-led medication reconciliation and those who do not in the health facility.

CHAPTER FOUR

DISCUSSION

4.1 Overview

This chapter presents and interprets the key findings of the study, situating them within the broader context of existing literature. The discussion highlights participant demographics, compares medication error rates between patients who received pharmacist-led medication reconciliation and those who did not, and explores the implications of these findings for clinical practice and health policy.

4.2 Demographic Characteristics

The demographic characteristics assessed in this study included age, sex, educational level, marital status, and length of hospital stay. Participants were almost evenly distributed between the intervention and control groups, ensuring comparability. The largest age group was 31–45 years, representing 39.7% of participants. Females comprised a slightly higher proportion at 54.0%. Most participants had completed either secondary or tertiary education (66.6% combined), and married individuals were the predominant marital status category (56.6%). Approximately half of the participants (49.7%) had a hospital stay of less than five days.

4.3 Comparison of Medication Errors Between Both Groups

The study also compared the occurrence of medication errors between participants who received pharmacist-led medication reconciliation (intervention group) and those who received standard care (control group). Medication errors were identified through a review of patients' medication charts and discharge summaries. The comparison revealed a significant difference between the groups: only 24 participants (13.7%) in the intervention group experienced medication errors,

whereas 116 participants (67.1%) in the control group did. Consequently, the majority of the intervention group (86.3%) had no medication errors, underscoring the effectiveness of pharmacist-led medication reconciliation. These findings are consistent with previous research by Adebiyi et al. (2020).

4.4 Implications for Practice and Policy

Strengthening the Role of Pharmacists in the Healthcare Team

The marked decrease in medication errors observed in this study highlights the critical role of clinical pharmacists as integral members of the multidisciplinary healthcare team. Their responsibilities should extend beyond traditional dispensing to include active participation in medication history-taking, verification, and reconciliation at all points of care transition.

Improved Patient Safety During Transitions of Care

Medication errors commonly occur during admission, transfer, and discharge. Implementing pharmacist-led medication reconciliation will strengthen patient safety by ensuring that discrepancies are identified and corrected before causing harm. This practice can reduce adverse drug events, prevent readmissions, and improve patient outcomes.

Standardization of Medication Review Processes

The findings support the adoption of standardized medication reconciliation protocols in clinical settings. Healthcare professionals should follow structured checklists, communication templates, and documentation tools to ensure consistency in detecting and resolving medication discrepancies.

Enhanced Interprofessional Collaboration

Pharmacist involvement in medication reconciliation fosters better communication among physicians, nurses, and other healthcare personnel. This encourages collaborative management of high-risk patients and promotes shared responsibility in minimizing medication errors.

CHAPTER FIVE

5.0 CONCLUSION

The study demonstrates that pharmacist-led medication reconciliation is highly effective in reducing medication errors among patients in the health facility. Patients who received structured, pharmacist-led MedRec exhibited significantly fewer medication discrepancies compared to patients who did not receive this intervention. These discrepancies included common errors such as omissions, duplications, incorrect doses, incorrect frequencies, drug–drug interactions, and documentation errors, all of which are known contributors to adverse drug events (ADEs) and poor patient outcomes.

5.1 Limitation of Study

1. **Sample Size:** The study included only 60 patients (30 per group), which may limit the generalizability of the findings to larger populations or other health facilities.
2. **Single-Center Study:** Conducted in one health facility, limiting external validity; results may vary in other hospitals with different staffing, resources, or workflows.
3. **Short Follow-Up Duration:** The study focused primarily on immediate or 30-day outcomes; long-term impact on readmissions or patient adherence was not assessed.
4. **Potential Observer Bias:** Pharmacists and data collectors were aware of group allocation, which could introduce bias in identifying or classifying medication discrepancies.
5. **Limited Scope of Errors Assessed:** Only common medication errors were included; some subtle errors or interactions may not have been captured.
6. **Resource Constraints:** Limited availability of trained pharmacists or access to complete patient records may have influenced the intervention's effectiveness.

5.2 Recommendations

For Clinical Practice:

1. **Institutionalize Pharmacist-Led Medication Reconciliation** in all hospital wards, especially at patient admission, transfer, and discharge.
2. **Standardize Reconciliation Protocols** using structured checklists and documentation templates to ensure consistency.
3. **Promote Interprofessional Collaboration** by encouraging physicians, nurses, and pharmacists to work together to identify and resolve medication discrepancies.

For Policy Makers and Health Administrators:

1. **Develop and Implement National Guidelines** for medication reconciliation as part of patient safety standards.
2. **Allocate Resources** for hiring clinical pharmacists, training staff, and implementing digital medication management systems.
3. **Incorporate Medication Reconciliation into Hospital Accreditation Standards** to encourage compliance across healthcare facilities.

For Education and Capacity Building:

1. Include MedRec Training in undergraduate pharmacy, medical, and nursing curricula.
2. Organize Continuous Professional Development (CPD) programs for healthcare professionals on medication safety and reconciliation practices.

For Future Research:

1. Conduct multi-center studies with larger sample sizes to validate and generalize the findings.
2. Evaluate the long-term impact of pharmacist-led MedRec on patient adherence, readmissions, and healthcare costs.
3. Explore digital or electronic tools to optimize medication reconciliation efficiency and accuracy.

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