

# Role of Clinical Pharmacist in Detailed History and Medication Reconciliation

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## Abstract

Transitional care involves medication review and medication reconciliation with systematic implementation to improve patient safety and effectiveness on diverse levels. Medication reconciliation is a recognized process of procuring patients' complete history of medication lists and comparing it with current medications to perceive and avoid medication discrepancies and drug-related problems. Medication discrepancies during hospitalizations are most prevalent and lead to adverse drug events and rehospitalization. Literature has been developed stating the most effective methodologies in implementing medication reconciliation programs to strengthen the evidence for widespread adoption. The current narrative has been designed to gather evidence on the process of medication reconciliation, its significance, and the necessary plan and strategies for implementing medication reconciliation by clinical pharmacists at hospitals.

**Keywords:** Transitional care • Clinical pharmacist • Medication reconciliation • Medication discrepancies

## Introduction

The Patient Protection and Affordable Care Act in 2010 emphasized the increased importance of medication reconciliation. Hospital admission is an interface of care and a complex process, with more than half of medication errors occurring. Discrepancies in medication history collection account for 67%-85% of medication errors, with potential harm ranging from 11%-59% [1,2]. Detailed history collection/medication reconciliation is the process of recognizing an accurate and error-free list of a patient's current/home medications, including name, dosage, frequency, and ROA details, and comparing it to the current list of medication consumption, identifying medication discrepancies, and documenting changes with the complete list of medications using accurate communications [3]. Advancement of medication reconciliation started with ripple effects of medication-related issues resulting in reduced quality of care among U.S. patients with more risk-sharing arrangements and costs. Accessibility of medication reconciliation in the healthcare system is since 2005 gradually been adopted worldwide since. The institute of medicine estimates reveals that at least 1.5 million escapable ADE occur within medication-related problems with an estimated cost of 4 billion dollars annually [4].

## Literature Review

Medication reconciliation is proposed by collecting the Best Possible Medication History (BPMH) (an inclusive list of all home medications before the hospital admission). The adaptation of BPMH in hospitals is appropriate for preventing medication-related issues

and improving pharmaceutical/therapeutic care [5]. The data indicated a greater incidence of medication-related inconsistencies between the BPMH and physicians' admission medication information, as well as adequate proof of medication discrepancies between the BPMH and physicians' admission medication details [6]. According to a recent systematic analysis, after hospital admission, 27% to 54% of patients had at least one drug difference from home meds, 19 percent to 75 percent of which were inadvertent, resulting in greater ADE rates and safety risks [7]. Studies have revealed the positive effects of detailed history collection and medication reconciliation identification and rectification at admission in reducing complications [8]. Accredited healthcare systems and hospitals suggest identifying and managing medication errors of omission, therapeutic duplication, contraindications, and drug-drug/drug-disease interactions [9]. Furthermore, educating the patient regarding medication safety and communication with care providers is essential. Many safety organizations and authorities adopt the medication reconciliation process to facilitate better patient health outcomes. In 2006, the World Health Organization (WHO) created a high-five initiative with fully documented SOPs to address patient safety issues by applying "Medication Accuracy during Transitions in Care [10]." Furthermore, in 2015, the progress of implementation guidelines was revealed [11]. Later, the European Union Network for Patient Safety and Quality of Care (PaSQ) initiative launched programs in Croatia to implement medication reconciliation, with the scope of work listed on page 5 [12]. The purpose was to introduce safe clinical practices in Croatian hospitals, as well as collect and publish data on the impact on patient safety.

## Clinical pharmacist

The medication reconciliation procedure involves a team of healthcare professionals with a "qualified clinical pharmacist" comparing the medications intended for the patient. A contemporary meta-analysis confirmed the significance of pharmacy-led medication reconciliation interventions in decreasing medication discrepancies, resulting in a greater positive impact score conducted before admission and during discharge [13].

In recent decades, the introduction of pharmaceutical care driven by clinical pharmacists has changed from dispensary positions to patient-oriented healthcare transitions. Pharmacists are sufficiently knowledgeable and trained for pharmaceutical care in many developed and developing countries. Clinical pharmacists' duties are increasingly changing to focus more on doing ward rounds with senior doctors and other healthcare professionals to track patient progress and medication-related difficulties to communicate better therapy management strategies [14]. The community and hospital pharmacists are primarily accountable for drug manufacturing, distribution, and dispensing, whereas clinical pharmacists can offer patient care and ensure patient safety with a wide range of services such as; medication therapy management and health-related outcomes. Clinical pharmacists work together with the multidisciplinary team in handling/administering drugs rationally, ensuring sufficient patient knowledge of dosage regimens and administration methods, and improving patient adherence and compliance [15]. The vital roles range from public health promotion and infection prevention to managing mental health and other chronic disease care.

The pharmacy profession is an essential and fundamental part of the healthcare system. The traditional role of pharmacists has been expanded from dispensing medications to a long way of ensuring the quality of healthcare by playing a direct role in providing care to patients as integral members of the medical management system. Rural communities without physicians have benefited from community pharmacy services since it is expensive to pay for doctors' services to provide basic healthcare. For greater compensation, more work prospects, and recognition in the healthcare industry, several reforms have increased the job happiness of Indian pharmacists. In low- and middle-income nations, several studies are carried out to evaluate the effects of clinical pharmacist treatments on patient outcomes and the use of health services. The findings showed

positive results for clinical pharmacists in improving treatment outcomes in chronic disease conditions of hyperglycemia, systolic blood pressure (SPB), cholesterol control, and asthma for a better quality of life [16]. However, the study was limited to just the impact and could not repose cost-related data resulting in inconsistent data to compare with different clinical conditions necessitating careful interpretation. A well-known cause of a lack of awareness about the additional benefits of clinical pharmacists' services and their implications in the Indian context assisting policymakers and stakeholders is a lack of awareness about the additional benefits of clinical pharmacists' services and their implications in the Indian context assisting policymakers and stakeholders is a lack of awareness about the additional benefits of clinical pharmacists' services and their implications in the Indian context assisting policymakers and stakeholders. The activities of pharmacists are divided into six categories:

1. Provide knowledge about illness stages through booklets
2. Investigating barriers to adherence and using motivational interviewing to enhance adherence
3. Advice on changing one's lifestyle
4. Pharmacovigilance, drug-drug interactions, and drug-food interactions are all part of pharmaceutical care.
5. Working with a doctor to adjust a medication regimen
6. Continue to provide patient follow-up care.

The drastic changes regarding the growth in demand for pharmacists in healthcare and patient needs have been significant in parallel to the redefinition of educational and professional tasks of pharmacists. To emphasize the clinical and patient-focused features of the clinical pharmacy profession, the Pharmacy Council of India launched the Doctor of Pharmacy (Pharm D) program in 2008. India is yet to encounter the significant job role and recognition of Pharm D in meeting international standards for pharmacy practice.

#### Clinical pharmacist-led outcomes

Clinical pharmacist roles and responsibilities result in three significant outcomes. Therapeutic outcomes are directly proportional to pharmaceutical care. Various studies have reported clinical pharmacist intervention influences the reduction of SBP and DBP in hypersensitive patients. Saleem et al. revealed a significant decrease in mean SBP ( $p=0.004$ ) and DBP ( $p=0.009$ ) in the interventional group to the control group [17]. Amer et al. also reported significantly similar results with pharmacist-led intervention in managing hypertension increased considerably in the interventional group ( $p<0.001$ ) [18]. Similarly, Javaid et al. reported better improvement in the intervention arm in SBP ( $p<0.001$ ) and DBP ( $p<0.001$ ) than in the control arm [19].

The results of three other trials on the effects of CP intervention in the treatment of diabetes are reported in the literature, and they range from favorable to considerable. Within five months of follow-up, Samia et al. observed no statistically significant changes in mean fasting blood sugar ( $p=0.116$ ) or HbA1c level ( $p=0.112$ ) [20]. Contrary to these positive findings, other studies have reported similar results [21].

Humanistic outcomes include medication adherence, improved patient drug literacy, and increased self-monitoring. Medication non-adherence rates are relatively increasing in major chronic disorders. Pharmacists use a variety of evidence-based techniques to improve patient compliance, including motivational interviewing, medication management, patient education, and the use of medication adherence aids.

Safety outcomes are of primary concern at hospitals, including drug-related problems that are frequently reported to reduce the quality of life and increase mortality and morbidity. Many studies have explored the clinical pharmacist's role in effectively identifying and preventing drug-related problems to physicians' knowledge. The process includes the pharmacist's participation in the multidisciplinary team for ordering, prescribing, and identifying medication errors and related issues. Furthermore, counseling from clinical pharmacists to patients and caretakers regarding discharge and follow-up information promotes better outcomes. A clinical pharmacist can also improve the level of markers for monitoring drug use, which can have a good impact on therapeutic outcomes (e.g. optimization of lipid levels for anti-coagulation use). Clinical pharmacist involvement has also been linked to better clinical outcomes, such as fewer hospitalizations, re-admissions, and illness episodes, according to certain research. More research in pharmacological care in different populations is important to interpret evidence of patient-centric care characteristics.

Drug-Related Problems (DRPs) are an occurrence or conditions involving drug therapy that may cause undesirable health effects stay [22]. It is estimated that around 5%-10% of hospital admissions were due to DRPs, and more than 50% are preventable [23]. DRPs are becoming a significant safety issue for hospitalized inpatients and can affect the quality of life for the patients, cause prolonged hospitalization, affects healthcare budgets, and even cause death [24]. Pharmaceutical care is the best way of identifying and resolving DRP, and the participation of clinical pharmacists in healthcare has shown significant results in decreased medication errors. Pharmacists play an inevitable role in transforming product-oriented service into patient-oriented care [25]. Community pharmacists frequently distribute drugs without reviewing prescriptions, and while these DRPs are avoidable, they are a common safety concern that results in patient damage and higher healthcare expenditures. Medication errors, adverse drug events, and, drug-drug reactions are all examples of DRPs, and they all have a major impact on morbidity and mortality as well as patient care [26].

There is a considerable variation in the delivery of pharmaceutical services offered by clinical pharmacists from one setting to another. The differences are visible in diverse aspects of pharmacy practice, pharmaceutical care, and public health. Clinical pharmacists specialize in patient care to comprehensively assess medication-related needs and manage complex/specialized regimens [27]. The defined CP scope is not limited to drug information, drug utilization, drug distribution, drug selection, drug evaluation, medication therapy management, disease state management, and pharmacy education/training. The recent effect of the COVID-19 pandemic has brought significant improvement in the services offered, such as; identification of triage, individualization of drug dosage regimen, drug monitoring regarding patient parameters, dose regulation of narrow therapeutic agents, drug intelligence, dosage calculation, ADR monitoring, reduction in rates of antimicrobial resistance, detailed history collection/medication reconciliation, patient counseling, Tele counseling services and implementation of national and international guidelines.

Beneath the risk-sharing arrangements by various policies and regulations, the financial burden and health outcomes of patients are the performance metrics of pharmaceutical care. The current review article is directed toward understanding the significance, implementation, plan, and outcomes of medication reconciliation in quantifying and analyzing unintentional medication discrepancies at hospitals; led by clinical pharmacists in Indian healthcare. The current review was developed to acquire knowledge from the literature regarding the significance and implementation of medication reconciliation and the various policies involved.

#### Process of medication reconciliation and accuracy of service

Optimization of patient outcomes along with reducing healthcare costs is key for medication therapy management at hospitals. The American Society of Health-System Pharmacists (ASHP) elaborates on the critical role of pharmacists and are not limited in the medication reconciliation process are listed below [28]:

1. Assisting in the creation and administration of systems for patient-centered medication reconciliation.
2. Informing patients and medical professionals on the advantages and disadvantages of the medication reconciliation process.
3. Serving as patient representatives throughout care transitions.

Medication reconciliation policies and procedures are established by pharmacists to enhance medication-related activities and to offer the required training to guarantee their competence and compliance with community medication treatment management activities.

Tasks like medication reconciliation should be given high attention in healthcare for patient safety since clinical pharmacists are required for essential transitions of care. In addition to actively participating in drug reconciliation efforts, pharmacists also have the following five additional essential or primary duties to complete: A medication reconciliation program should be promoted in the community by (1) developing policies and procedures for processes, (2) putting processes into place and continually improving them, (3) ensuring competency in medication reconciliation, (4) offering operational and therapeutic expertise in data collection, and (5) advocating for such programs. The following are the functions briefed:

The establishment of policies and procedures by pharmacists that

enhance the delivery of patient care services (medication reconciliation processes), the implementation and operation of evidence-based medication reconciliation with resource optimization, the training of organization staff on the significance of patient safety, and the promotion of medication reconciliation that focuses on performance-improving medications are all aspects of policy and procedure development.

Efforts in medication reconciliation are required for implementation and performance improvement. Creating a vision/mission and expectations for medication reconciliation activities, securing executive-level support for resource acquisition, identifying implementation barriers to avoid unpleasant outcomes by ensuring a safe and effective practical model with potential solutions, and directing workflow with delegation responsibilities of healthcare providers (pharmacy tech) are just a few of the activities.

Identifying all healthcare providers and support staff, developing competency training and skills assessments for staff members (e.g., conducting a medication interview, performing medication reconciliation, and taking a medication history), providing education and conducting assessments, and providing didactic or simulated training for procedures are all important aspects of training and competency assurance.

Clinical pharmacists should establish information systems for automated provider order input and electronic medical records to assure and assist medication reconciliation throughout the continuum of care. Establishing strategies for data extraction from medical records should be considered.

To evaluate the effectiveness of the medication reconciliation process, clinical pharmacists should be the voice for patients, healthcare providers, and the general public. A few of the activities include clinical grand rounds, patient counseling, professional conferences, and mass communication for newsletters and PSAs. In addition to highlighting the value of completeness, these activities should highlight the significance of timely and accurate communication between healthcare providers, clarify and describe the crucial role that technology and electronic medical records play in supporting healthcare providers, and provide strategies for preventing adverse events related to medication overuse, misuse, omission, duplication, and other discrepancies.

According to published research, resource limitations are crucial to clinical pharmacists' ability to successfully execute medication reconciliation across the continuum of care. Significant resources suggest that the responsibilities of pharmacy technicians, students, and residents be extended. If they have received the appropriate training, these people can help with the documenting of medication histories. To standardize workflows, encourage safe medical practices in the community, and take on leadership roles in the healthcare industry, only a tiny fraction of individuals participate in a guide for multidisciplinary efforts to establish and define policies and procedures for their organizations.

In medication reconciliation, the clinical pharmacist's accuracy is higher than that of a physician. A study of fifty-five patients found 353 inconsistencies by clinical pharmacists and 58 by doctors when comparing physician-obtained medication histories to pharmacist-obtained medication histories. Clinical pharmacists were shown to minimize total medication reconciliation discrepancies (p<0.0001) [29]. In a comparable study concentrating on emergency rooms, total disparities were shown to be reduced by 33% [30]. According to several research, pharmacists recognized a considerably larger number of drugs used per patient, including OTC and herbal treatments, when compared to nurses (p<0.001). Outpatient pharmacists were contacted substantially more frequently than nurses, indicating that the amount of time pharmacists spent filling out drug histories were efficient for patient care [31]. In medication reconciliation, the clinical pharmacist's accuracy is higher than that of a physician. The availability of resources to clinical pharmacists is limited, but proper utilization of trained students, residents, and technicians in completing the task can be helpful. A study was conducted on fifty-five patients comparing physician-obtained medication histories to pharmacist-obtained medication histories. According to the American Society of Health-System Pharmacists, acquiring prescription histories decreases possible mistakes by 82 percent [32]. Incomplete/incorrect information, illegible prescriptions resulting in dangerous medication interactions, and treatment duplications are also common mistakes.

## Significance of medication reconciliation

Mortality rates: Non-adherence to medication reconciliation can result in various complications. Bond and Raehl; 2007, authored a paper to evaluate the type of hospital-based clinical pharmacy services linked with mortality rates by drug admission histories and death rates [33]. Seven clinical pharmacy services were linked to the provision of services and lower death rates. Examples of services offered by pharmacists include drug use evaluation, in-service training, adverse drug reaction management, drug protocol management, pharmacist participation in the cardiopulmonary resuscitation team, pharmacist participation on medical grounds, and admission drug history gathering. The research found a 107.78 percent reduction in fatalities per hospital (20.2 percent).

**Identification of allergy:** The pharmacist is uniquely qualified to do medication reconciliation and allergy interviews with patients. Compared to a nurse, pharmacists were able to gather medication histories from the moment of admission until the recording of allergy information, according to research. It is being tested to see whether it may reduce prescription delivery delays and the time spent waiting for allergy confirmation. Both groups of patients had similar patient characteristics. The pharmacist received the patient's prescription history, and further differences were discovered between the patient's reported home meds and the hospital's first drug orders. When compared to nurses, a larger percentage of study participants got treatments, and a higher mean number of goods were identified per patient, including herbal remedies. Dispensing pharmacists spent 14.4 9.9 minutes on average in the medication reconciliation procedure, whereas nurses spent 24.3 19.8 minutes on average. The time spent by pharmacists on medication reconciliation was rated efficient and useful [34].

**Discharge medications:** Medication discrepancies transpire at transitions of care and have a negative influence on delivering patient care. Farley et al. conducted a study to assess physician-managed medication reconciliation and observed minimal involvement of physicians and nurses compared to pharmacist-led medication reconciliation and enhanced intervention with a pharmacist care manager in the intervention group. A total of 592 subjects from internal medicine, family medicine, cardiology, and orthopedic services were assessed with clinically significant medication discrepancies following hospital discharge for clinical pharmacist intervention. The mean number of medication discrepancies for effect in 90 days' post-discharge was calculated. The authors concluded that medication reconciliation and discharge medication plan communication might effectively improve therapeutic outcomes. In the interventional group led by a clinical pharmacist, it was shown that medication discrepancies were reduced after 30 days (p=0.013), demonstrating a positive impact of a clinical pharmacist on medication-specific outcomes after discharge [35]. Assessment of discharge summaries pre-discharge by a clinical pharmacist can result in the identification/prevention of drug interactions and therapeutic duplications. Medication reconciliation associated with patient counseling at discharge can improve medication adherence and patient compliance.

Unintentional medication discrepancies and associated risks: Medical mistakes with no clinical justification are known as unintentional medication discrepancies. Drug omission/addition, medicine substitution within the pharmacological categorization, improper dosage, inappropriate method of administration, and incorrect frequency are among the categories. All unintended prescription differences are brought to the attention of an expert panel, which includes a clinical pharmacist and a clinical pharmacologist. class 1: medication inconsistencies unlikely to cause discomfort/clinical degeneration, class 2: medication discrepancies causing moderate discomfort/clinical deterioration, and class 3: medication discrepancies causing severe discomfort/clinical deterioration [36]. An increasing number of pharmaceuticals and a low degree of patient comprehension regarding home medications are the two primary factors of unintended medication discrepancies. Recent research has shown the link between two predictors and the frequency of unintended drug discrepancies, therefore pharmacists should pay special attention to polypharmacy and the degree of therapy [37]. There have been studies on the function of the clinical pharmacist in reducing unintended medication differences. Accidental medication disparities account for 16.8% of all unintentional medication differences, according to Ivana et al. Drug omission (63.9 percent) was the most common kind of unintended medication difference, followed by wrong dosage (63.9%) (24.2%).

Medication reconciliation operations guided by clinical pharmacists are critical in discovering medication inconsistencies and reducing unfavorable patient outcomes in clinical settings [38].

**Plan**

Strategies by Transitions of Care: The transition of care is defined by the National Transitions of Care Coalition (NTOCC) as the migration of patients from one clinical practice environment to another [39]. Drug-related issues are widespread due to inconsistencies in history gathering and recordkeeping during medication reconciliation. During chart audits at one facility, it was determined that 60 percent of prescription mistakes occurred during the transfer of care [40]. NTOCC intervention techniques to improve care transitions in a nutshell [41].

1. Evaluate the patient's and family's drug safety.
2. Ensure that a defined mechanism for the safe handover of patient care is in place.
3. Use education and counseling to actively involve the patient and their family in the decision-making process.
4. Obtain and communicate the required information between the patient and healthcare professionals as soon as possible.
5. Make patient follow-up treatment easier.
6. The healthcare practitioner must be actively involved in the patient's healthcare management.
7. Both the transitioning provider and the receiving provider share responsibility for the patient's care.

A telephone call-based research conducted within 24 days after discharge found that patients who were able to contact had significantly lower 30-day hospital re-admission rates and emergency department visits than those who were unable to contact (p<0.001). There were 401 patients identified, with 277 obtaining pharmacist telephone assistance and 124 unable to be reached. When compared to the control group, the rate of unplanned hospitalization was considerably lower in the intervention group. Patients can benefit from a pharmacist's telephone intervention as part of a comprehensive discharge procedure by minimizing the likelihood of unexpected hospitalization [42].

Another study has developed a model concerning the combined efforts of pharmacists and social workers for transition-of-care with all-cause re-admission rates (p=0.012). Demographic and clinical characteristics were obtained for admission and re-admission details within 30 days of discharge and compared to patients with usual care groups and concluded that a united pharmacist and social worker program established a substantial reduction in 30-day all-cause re-admission rates in the same hospital. The overall literature findings have highlighted the importance of creating patient-safety prototypes to focus on medication reconciliation programs [43].

**Best Possible Medication History:** Acquisition of the best possible medication history on admission is a serious step in the medication reconciliation procedure. This strategy can be best and most accurately performed by any healthcare team member (including a student) and is not restricted to clinical pharmacists. Several pieces of evidence have been developed that reveals that any healthcare provider can acquire the accurate best possible medication history for patients on admission to the hospital and serve the best outcomes by identifying all medication discrepancies. A total of 151 patients were comprised in the study, out of which at least one had an unintended difference with the standard error of omission of regularly used medication, and 38.6% had differences with a potential cause of clinical deterioration and concluded that better instruments and tools must be introduced for accurate medication history collection [44].

However, challenges exist in completing the most essential task of utilizing the BPMH as a part of medication therapy management and pharmaceutical care. BPMH is an essential and mandatory step, but the purposeful evaluation of identified drug therapy problems (DTPs) will improve patient health outcomes [45].

Up-to-date resources for medication reconciliation have focused on admission to healthcare facilities with less attention on transfer and discharges within the facilities. Specifically, medication discrepancies at discharge are problematic in identifying adverse events and resolution [46]. Within 30 days after discharge, adverse events can occur in up to 25% of patients, and 50% of them can be avoided with proper monitoring. One of the most important ways to avoid these occurrences is

to pay deliberate attention to medication reconciliation, transfer of care to community-based individuals, and improved patient education using effective tools/procedures, which is a crucial part of patient care [47]. The medication reconciliation process must remain the cornerstone of pharmaceutical care for all the patients in the continuum of medical care. This process should not stop with the acquisition of BPMH on admission; the greater emphasis should be placed on identifying and resolving DTPs for every patient throughout the trajectory of care. The critical steps with optimizing each patient's pharmacotherapy regimen and proper monitoring on admission, transfer, and discharge must be compulsory to ensure the most significant impact on reducing ADR/AE and reducing health-related utilization of resources. Thus, obtaining accurate BPMH on admission and following DTPs to transfer and discharge are compulsory to ensure optimal pharmacotherapy and improved health outcomes.

The various challenges in obtaining BPMH are; 1. Health information systems that are insufficient or fragmented 2. History-taking errors, 3. The time-consuming nature of the procedure 4. Conflicting clinical obligations, 6. Lack of expertise by junior clinicians in obtaining a medication history. 5. Poor patient understanding of home medication regimen (low literacy/vulnerable groups). To overcome the challenges mentioned above, the following strategies have been reported in the literature structured with plan-to-study-act.

**PDSA cycle 0: Medication reconciliation educational intervention:** The goal is to create a medication reconciliation-friendly culture by increasing institutional commitment and educating physicians on procedural and technical improvements. The education of pharmacists and physicians is divided into two parts: fundamental principles and specific training in computerized medication reconciliation.

**PDSA cycle 1: Testing BPMH production on patients hospitalized in the emergency department:** Pharmacists and technicians created BPMH for patients admitted to the emergency room to capture their findings in a paper note, which was then examined by medical professionals and recorded on the bedside chart. The list of drugs, information sources (e.g., community pharmacy, patient, family/caregiver, clinical outcomes, and outpatient EHR), and differences from the medication list are all reported in the study.

**PDSA cycle 2: Expansion of the BPMH program to non-emergency departments:** Because the majority of admissions may occur outside of the emergency department, the program must account for direct admissions from outpatient physicians, transfers from other hospitals, and admissions from the post-anesthesia care unit after surgery. Clinical pharmacists should have the ability to identify patients admitted through various paths.

**PDSA cycle 3: Prioritizing the limited resource of clinical pharmacists:** BPMH by pharmacy technical is ideal for identifying high-risk patients. Development of an EHR tool for clinicians to deliver clinical information via medication review to pager all the data in the work queue.

**PDSA cycle 4: Conversion to electronic documentation - improving visibility and transparent availability of data:** Clinical care teams and information technology should develop electronic documentation due to the lack of accessibility to medication reconciliation data. This electronic documentation of BPMH promotes feasible follow-up and future access to additional information (the last prescription fills the patient's preferred community pharmacy, prescription drug coverage, and reported medication adherence and compliance).

The four-step model for obtaining the Best Possible Medication History (BPMH) is presented below in Figure 1.

**Implementation and barriers**

The process of gathering, organizing, and communicating medication history data across the continuum of care is tedious and accounts for various implementation barriers. These barriers are based on basic factors such as the variation in language for an interview, involvement of different disciplines (medicine, pharmacy, and nursing), data duplication, and medication discrepancies. The following are the approaches favoring the implementation of a medication reconciliation program:

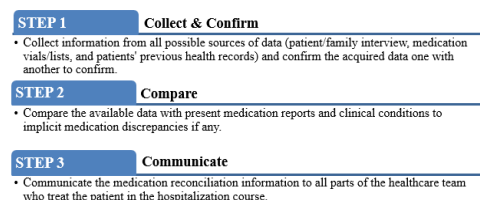


Figure 1. The four-step model for obtaining the best possible medication history

1. Involvement of a multidisciplinary planning team who are open to modification and negotiation.
2. Recognize that effective medication reconciliation will not be attained by just refining the existing practice. Substantial role changes are mandatory.
3. Recognition of the need to trial the process with a pilot study before refining the SOPs.
4. Promote the benefits of the process with better communication among different disciplines.
5. Plan to devote sufficient resources for monitoring.

Implementation of medication reconciliation is a systemic process using a unified standard for detecting and resolving medication discrepancies. The literature highlights the huge responsibility of clinical pharmacists in contributing to medication safety and patient care.

The barriers/challenges associated with medication reconciliation implementation across the continuum of care include the following;

1. Development and implementation are very complex, considering the care sites cause a lack of standardization.
2. Lack of garnering executive leadership support for physicians, nurses, and pharmacists for participating in medication reconciliation.
3. Lack of time commitment by healthcare professionals.
4. Lack of patient data resources/insufficient skills to utilize the data.
5. Incomplete patient old records and medication documentation
6. Fast and unplanned discharge results in no chance to check the medication.
7. Lack of available space for medication overview discussions with multidisciplinary.
8. Unable to develop rapport with the patient.
9. Lack of appropriate guidelines for medication reconciliation.

These barriers are often associated with non-compliance and medication discrepancies. The absence of safety culture and operational processes have been explained in the literature. The practice was also reported to be uncomfortable for some patients. There was a need for more external expert provisions in planning the implementation process. Implementation initially times might be complex and tiresome, but the barriers can be controlled over time with a proper clinical care team and experts.

## Discussion

Prevention of medication discrepancies such as adverse drug events remains the top priority for achieving patient safety in hospitals/clinics diagonally across the continuum of patient care. Medication reconciliation is developing the most accurate medication list and history collection, such as drug name, dosage, frequency, and route of administration, and associating it with the current medication list to avoid drug interactions and therapeutic duplications. The main goal is to provide correct medications at the proper dosage, frequency, and route for the patient for all transition points within the hospital. Medical care-related organizations have demonstrated the functions and applications of medication reconciliation implementation at all transitions of care (admission to discharge) to be an effective strategy for preventing medication discrepancies.

Although medication reconciliation programs are proven effective for better patient outcomes during hospitalization and post-discharge, the implementation of other programs by clinical pharmacists (ADR identification/monitoring/reporting, drug intelligence, patient counseling, and telemedicine services) at hospitals is essential in maintaining and ensuring progressive outcomes. The entire process involves the vital part of the clinical pharmacist team.

## Conclusion

Medication reconciliation, when programmed effectively, can significantly decrease medication errors and support the safe use of medications. Clinical pharmacists are appropriately qualified to lead the

multidisciplinary team to establish and sustain constructive medication reconciliation processes in healthcare settings. Various national and international policies and regulations have been developed stating the critical roles of clinical pharmacists in medication reconciliation. Lack of awareness regarding the various significance and implementation barriers of medication reconciliation among healthcare settings must be improved with the evidence from the literature. Since clinical pharmacists care more about patient safety, medication reconciliation programs must be developed and monitored by hospital pharmacy departments.

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## Ethics Statement

Not Applicable.

## Authorship Statement (as per Credit)

Mohammad Azeem: Conceptualization, writing review, and editing, project administration, Pankaj Arora: Writing review and editing, project administration, supervision, Yousif Alosaily: Writing review and editing, Rolla Mohammed Ahmad Alfahhad: Writing review and editing

## Conflict of Interest Statement

Above authors declare no conflict of interest.

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