

Medication Reconciliation: A beneficial tool in patient safety

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Abstract

This is a narrative review developed after referring to 20 original research papers, two review articles, and the latest WHO guide related to the concept of medication reconciliation. Medication reconciliation plays an important role in reducing medication errors. Various errors happen while prescribing drugs to patients, leading to discrepancies such as the omission of drugs from medication orders, incorrect dosage, and frequency of administration of the drug. All these incidences can affect patients' health and have the potential for adverse drug events. By reconciling medications at admission, transfer, and discharge, it has been observed that a lot of discrepancies have been resolved, and adverse drug events have been prevented, thus securing proper treatment outcomes and enhanced patient safety. Documenting drugs that the patient has already been taking and prescribing drugs for the current condition in accordance with past ones is the basic outline of medication reconciliation. It is only possible to carry out this process smoothly if one is trained with the concept of the process and aware of individual responsibility. Physicians are the prime healthcare workers who must be completely aware of the process followed by nurses and clinical pharmacists who anchor this ship of medication reconciliation. All healthcare workers involved in this process need to follow the principles for implementing medication reconciliation. A meticulous conductance of medication reconciliation can help hospitals in the long run for coordinated functioning of patient safety-related issues and thus strengthen the quality of patient care. The objective of this review is to make healthcare workers aware of medication reconciliation and the potential consequences that can occur if reconciliation is not carried out diligently.

Keywords : Medication Reconciliation, discrepancies, drug-related adverse events, patient safety, drug documentation

Background

Drug-related adverse events (ADEs) are a leading cause of injury and death in global health care systems⁽¹⁾. Medication reconciliation (MedRec) is an effective tool to prevent such events. MedRec simply does not mean documentation of current medicines consumed but also a detailed substantiation which includes noting a proper history of the patient right from initial complaints to the final diagnosis. A major reason for implementing MedRec in hospital settings is to prevent errors in patients' medication regimens during admission, transfer, and discharge.

American Pharmacists Association (APhA) defines MedRec as "the comprehensive evaluation of a patient's medication regimen any time there is a change in therapy in an effort to avoid medication errors such as omissions, duplications, dosing errors, or drug interactions, as well as to observe compliance and adherence patterns. This process should include a comparison of the existing and previous medication regimens and should occur at every transition of care in which new medications are ordered, existing orders are rewritten or adjusted, or if the patient has added non-prescription medications to (his or her) self-care"⁽²⁾.

Research data indicates that up to 67% of patients admitted to the hospital had a prescription error and were clinically important in up to 59% of cases⁽³⁾. This narrative review may

suggest the need for MedRec among all patients for their safety and effective care. We reviewed 23 different types of articles for this write-up, including 20 original research papers, two review articles, and the latest World Health Organization (WHO) guidelines related to the concept of MedRec. A large body of data demonstrates the value of MedRec in reducing ADEs and discrepancies, thus improving patient safety. It was observed that implementation of multidisciplinary MedRec was associated with significant decreases in the number of hospital admission and discharge medication discrepancies and serious/life-threatening errors.

Medication Reconciliation

According to WHO⁽⁴⁾, MedRec is the formal process in which health care professionals partner with patients to ensure accurate and complete medication information transfer at care interfaces. WHO introduced 'The High 5s Project' in 2017, an internationally coordinated initiative, to test the feasibility of implementing standardized patient safety protocols and determining the impact of the implementation on certain specified patient safety outcomes. This project also outlined specific operative procedures (SOPs) for MedRec as an integral part of patient safety protocol.

Preparing SOPs aims to provide standardized procedures all over the health system. In spite of this, efforts to standardize healthcare processes through various methods have been met

with limited enthusiasm and are only slowly affecting the delivery of healthcare. A variation at an individual level about understanding the MedRec process is one of its drawbacks. WHO research indicates that all countries are considering the SOPs but that only a few have managed to adapt them and are doing so inconsistently, hinting that a complete adaptation of the standardization will take some time to show adequate results in the future.

The High5s SOP document⁽⁴⁾ mentions certain guiding principles and stepwise implementation of MedRec, which are mentioned below-

Principle 1: To ensure safe prescribing and accurate patients' medication lists which is needed to be updated and accurate.

Principle 2: All healthcare interfaces should have a formalized process for MedRec.

Principle 3: During the episode of care, MedRec begins with admission of an individual itself.

Principle 4: Compulsory integration of MedRec into existing processes for medication management and patient flow.

Principle 5: The hospital staff must be entirely aware of their roles and responsibilities in the MedRec process.

Principle 6: Participation of patients and their families strengthens the reconciliation process

Principle 7: Staff responsible for the procedure must be well-trained in taking the Best Possible Medication History (BPMH)

Process of Medication reconciliation

1) *Compile a list of a patient's current medications*

The beginning and most crucial step of the process is preparing a list of all the current medications a patient is taking. It is also beneficial for physicians to continue their treatment after completing a medication list. The BPMH is a thorough documentation of the patient's symptoms and the drugs that are being consumed.

Doctor-patient dynamics also play a part in the complex process. One important drawback that often goes unnoticed is the recall bias from patients leading to an incorrect medication list. The nature of this error has various forms. Some patients tend to have multiple consultations for one single problem, and thus a certain drug can be prescribed twice at one given point.

Over-the-counter drugs, multivitamins, and herbal supplements taken at that point of time must also be included in the medication list, which patients often fail to notify their doctor. Memory issues may make it more difficult for patients to recall medication regimens. Along with the name of the medicine, it is important to note the prescribed dosage, formulation, route and frequency of administration.

During admission, if a patient is not in the state to answer, family members can intervene to help the consultation team to complete the history. It is equally important to make patients and their families aware of the significance of MedRec and how it will benefit the treatment process. This guarantees that patients and their families will not only mention their ongoing medication but also guide the prescribers if they observe any mistakes.

2) *Create a list of medicines that need to be prescribed*

Doctors prescribing medications for a patient's current condition should be similar to what the patient has previously been taking. While doing this, it is necessary to avoid prescription errors so that reconciliation is not affected. Factors such as insufficient knowledge of the prescribed drug, its recommended dose, route, frequency, duration, and drug interaction can lead to prescription errors. Also, improper handwriting and incomplete patient history documentation, especially for allergies and contraindications, can also cause prescription errors. Ratnamraju et al., in their study, noted high prescription errors, which after the application of appropriate interventions were significantly reduced⁽⁵⁾.

3) *Comparing the list of medications*

Commonly, discrepancies tend to occur during the admission of the patient. However, every transition point has its own importance when it comes to the reconciliation of medications. A meticulous comparison of every prescribed medication with the previous one aids in identifying any discrepancy that might be present while prescribing the new drugs to the patient for their ongoing ailment.

4) *Identification of discrepancies and resolving the issue*

When the steps mentioned above are carried out properly, variation is detected between the medications prescribed and the patient's previous medications. However, if a physician fails to reconcile a drug on an authorized form, it is the duty of a clinical pharmacist or a nurse to alert the concerned person.

Discrepancy means if a patient's previous treatments for existing health problems do not correspond with the medications that are being prescribed for their current condition along with existing comorbidity⁽⁶⁾.

The High 5 SOP by WHO⁽⁴⁾ also suggests functional models for smooth conductance of the reconciliation process. These two models are named as the Proactive model and the Retroactive model.

Proactive model

The Proactive model consists of 3 steps: (Figure 1)

- a) Obtaining the best possible medication history by physicians.

- b) Utilizing the medication history to determine whether to continue the drugs or discontinue them, change the medications, modify the doses or change the frequency.
- c) Prescribing drugs for current complaints according to information obtained via patient's history and laying the initial admission orders.

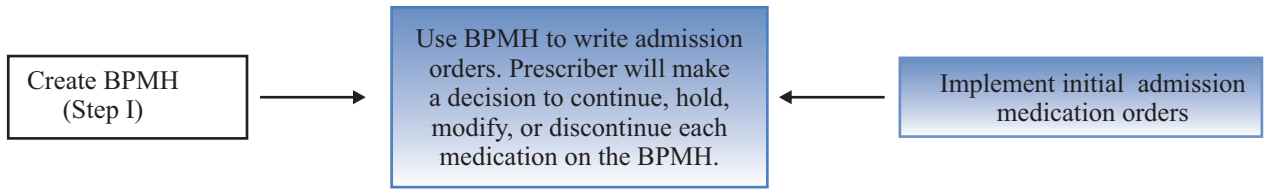


Figure 1: Medication Reconciliation at Admission (Proactive Model)

[Figure adapted from WHO- Implementation guide: Assuring medication accuracy at transitions in care 2014]

The proactive model concentrates on the best possible medication history needed from a patient. However, there is still a chance of discrepancies; hence, reconfirmation and constant evaluation of the process is necessary.

Retroactive model

The Retroactive model consists of the following steps: (Figure 2)

- a) Documenting the initial admission medication order, comparing them with medications of best possible medication history.
- b) Identify the discrepancy, reconcile the differences and revise the initial admission order.
- c) If the discrepancy observed was intentional, i.e., if the prescriber deliberately added, omitted, or changed the medication without proper documentation and mentioning its purpose, it must be brought to the attention, and its proper attestation must be carried out.
- d) After noting down medication history and current prescriptions, a continuous record of both these categories should be maintained and updated as required.
- e) It should be made sure that the entire process of prescribing new drugs & record of old drugs is documented on a designated form to avoid confusion.

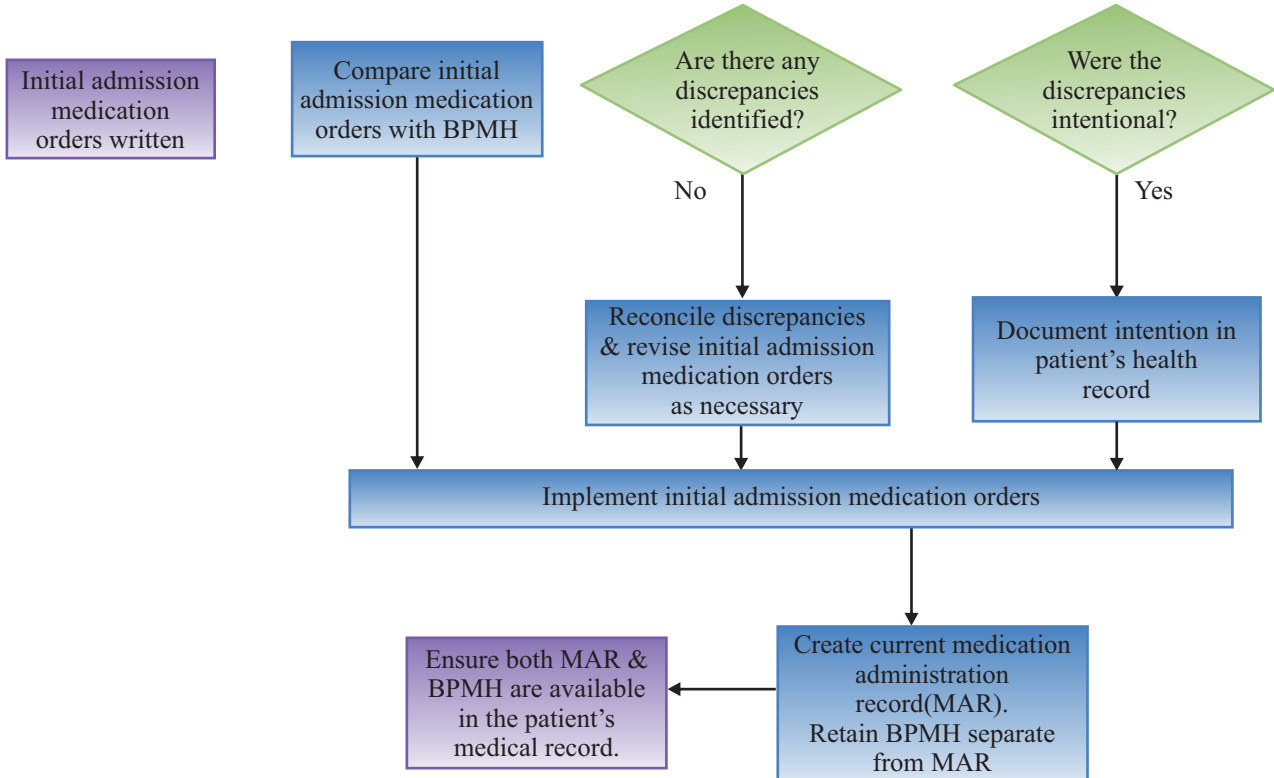


Figure 2: Medication Reconciliation at Admission (Retroactive Model)

[Figure adapted from WHO- Implementation guide: Assuring medication accuracy at transitions in care 2014]

The retroactive model can help in optimum reconciliation.

Incidence of medication reconciliation related discrepancies

Discrepancies may result in a medication reconciliation discrepancy leading to errors. In the past decade, it has been established through many studies that regular application of reconciliation can help reduce medication errors⁽⁶⁻⁹⁾. Despite numerous studies proving the need for MedRec to be implemented, a blind eye is turned to its implementation. The nature of discrepancies is often categorized as intentional and unintentional ones⁽⁹⁾. Intentional discrepancies are those when the prescriber has deliberately changed the medication and failed to document it or provide a rationale for the same. In contrast, unintentional discrepancies are considered when the caregiver completely omits the details about the patient's drug at any given point of time.

Discrepancies during admission

It is expected that medication reconciliation should occur at every transition point of a patient's hospital stay. Clinicians, while taking the medication history, often overpass the documentation process. Prins MC et al. conducted a study on medication reconciliation in psychiatry patients and identified multiple discrepancies in medication history, where 78% of patients had at least one discrepancy⁽¹⁰⁾. The study conducted by Breuker et al. at the Department of Montpellier, France, observed that 29.4% of patients had at least one Unintended Medication Discrepancy (UMD) at admission or discharge⁽¹¹⁾. Breuker et al. also reported that the majority of unintended medication discrepancies were present significantly in older patients with chronic diseases. This study also disclosed that most of the discrepancies were omission (57.3%), wrong dose or frequency (38.9%), and inappropriate addition of medication (3.7%)⁽¹¹⁾.

Another prospective, observational study was conducted by Chung et al. at Saint-Antoine Hospital and University teaching hospital in Paris on medication reconciliation at admission. The study reported about 70% omission of medications, which included the wrong dosage, additional medications, and drugs were documented on the entirely wrong form⁽¹²⁾. Mazhar F et al., in a study to assess the extent of discrepancies in medications during admission of patients in the Medicine and Surgery department, reported about 54% intentional discrepancies and 59% unintentional discrepancies. The majority were omission errors (47.6%), followed by modification dose, frequency, and route of administration (12.7%). Other minor discrepancies were drug prescribed without any kind of indication present for it (3.3%) and therapeutic duplication or drug interaction (2.3%)⁽¹³⁾.

Such high levels of discrepancies reported through many studies indicate that medication reconciliation needs to be

given more importance. Amongst the reported discrepancy, it is evident that most of them are related to the omission of drugs. The omission of drugs can create difficulty for the patient and the doctor, especially while prescribing drugs for current acute conditions. Cornish et al., in their study, reported 46.4% of omission of regularly used medications and 38.6% discrepancies could have caused moderate to severe damage to patients' health⁽¹⁴⁾.

Discrepancies during transfer

After admission, the next area prone to the discrepancy is the transfer of the patient from one point to another. Medications are often revised during a transfer of patients, and if there is no optimum communication between healthcare workers, discrepancies and errors might occur. JY Lee et al. evaluated medication reconciliation during internal transfers of patients and reported that 62% of patients had at least one unintentional discrepancy, and 55.6% were medication omission. In 36.4% of the cases, at least one unintentional discrepancy could result in clinical deterioration⁽¹⁵⁾.

Discrepancies during discharge

Discharge from the hospital also holds a crucial position in MedRec. Along with reconciliation, the information must be effectively communicated to the patient. In a cross-sectional study by Grimes et al., to evaluate factors associated with non-reconciliation of medications, observed that 50.1% of patient case files did not have medication reconciled, and 63% of them had potential moderate harm, whereas 2% had potential severe harm to the patient's health⁽¹⁶⁾.

JD Wong et al., in a study to evaluate discrepancies at discharge, observed that 70.7% of patients had at least one discrepancy. The author observed 22.9% of omission discrepancy and 29.5% discrepancy had the potential to cause patient discomfort⁽⁹⁾. Rustarazo et al. observed that 32.4% of patients had reconciliation error at discharge, and out of these, 71.4% of patients faced omission of the drug in their discharge medication order, while 51% of patients were at moderate to severe risk of suffering from an adverse drug event⁽¹⁷⁾.

Across all of these studies, one common factor identified was the frequent omission of drugs on documents and poor communication among healthcare workers, partly due to a lack of awareness on the part of healthcare workers demonstrating the poor practice of medication reconciliation.

Is lack of knowledge responsible for a high rate of medication reconciliation discrepancy?

Before implementing any procedure, it is important to have full knowledge of the same. MedRec, as a part of the patient safety routine, is usually explained to all the clinicians, nurses, and clinical pharmacists in a tertiary care setting. The purpose of creating multi-level awareness or spreading knowledge is essential as it helps in the reduction of errors.

Lemay J et al. assessed the knowledge, perception, and practices of physicians and pharmacists regarding MedRec and reported that pharmacists were significantly more aware of the concept as compared to physicians. However, physicians were significantly more aware of the existence of MedRec policy in their hospital⁽⁹⁾, indicating a disparity between knowledge of procedure and its practice amongst physicians.

A study by Lester et al. reported that only a few participants had a clear idea of acquiring the best possible medication history before intervention (34.3%), while after the intervention, 81.1% knew proper techniques for obtaining the best possible medication history⁽¹⁸⁾. Thus, this study depicts how applied intervention can drastically boost clinicians' knowledge and possibly improve their medication reconciliation practice.

Improving Medication Reconciliation for better patient outcome

A clinical pharmacist works with physicians, nurses, and patients to ensure that medications are prescribed to patients. They are educated and trained in a wide variety of direct patient care settings, including medical reconciliation. The clinical pharmacist helps intercept discrepancies and correct them by notifying the clinicians. Various studies showed that clinical pharmacists conducting medication reconciliation might reduce the discrepancies and may improve patient outcome.

Beckett et al. tested the effectiveness and feasibility of pharmacist-led admission medication reconciliation, comparing the standard MedRec performed by residents or interns versus the pharmacist-led MedRec within 24 hours of patient admission. The pharmacist utilized a minimum of one source of information from the patient's electronic medical record, documented a detailed history, and also interacted with family members. Along with family interaction, the pharmacists interviewed patients whenever possible, analyzed the home medication list, examined the prescribed vials, and communicated with the pharmacy. Patients' primary medical residents were informed of interventions through electronic paging, telephone conversations, or in person. A 48-hour follow-up survey revealed that pharmacist-led patients had appropriate medication profiles compared to the control group. The common discrepancies observed were omissions, wrong doses, routes, or frequencies. In this study, more discrepancies were identified by the pharmacist than by the residents or interns⁽¹⁹⁾. According to Nester et al., pharmacists who assist patients with MedRec identified more discrepancies than the nurses⁽²⁰⁾.

Walker et al. compared the outcomes of MedRec at discharge between the control and pharmacist-led groups. Omission of

medications was a common discrepancy in both the groups, but patients in the pharmacist-led group had a significantly lesser discrepancy of missed doses or frequency⁽²¹⁾.

Clinical pharmacists are the missing puzzle of MedRec, and interventions by them can improve the procedure compared to clinicians and nurses. Galvin et al. evaluated the contribution of clinical pharmacists to MedRec during admission by verbally communicating discrepancies to the clinicians and observed that 50% of these interventions were accepted and discrepancies were resolved⁽²²⁾.

The studies mentioned above indicate that clinical pharmacists have adopted various activities for effective MedRec. There are two techniques that are common, which are detailed discussions with patients and their families, and information gathered from their record-keeping. The documentation was done so that discrepancies found were resolved immediately, making it easier for physicians to prescribe drugs. Thus such meticulous methodology must be undertaken by every clinician and nurse to avoid any discrepancies.

Usage of new-age technology for efficient Medication Reconciliation

Technology is changing with time, and the medical community is adapting to it. The computerization of patient records has allowed doctors to create a detailed database of patients. Though every hospital has not created a database, the ones that have, have exhibited effective patient management. In July 2013, Taiwan's National Health Insurance Administration (NHIA) implemented a patient-centered NHI PharmaCloud System to provide good medication quality and help physicians and pharmacists ensure patients' medication safety⁽²³⁾. Hung et al. used this cloud-computed system to gather the best possible medication history and evaluated the impact of MedRec via this system on geriatric patients. Several promotional activities were implemented, including playing videos, posters, and seminars for patients and healthcare professionals. Simultaneously, their hospital also developed a Computerized Physician Order Entry (CPOE) system, integrated with PharmaCloud, where the physicians could easily detect discrepancies and reconcile and revise those medication orders. In parallel, they also established an electronic communication portal where physicians, nurses, and clinical pharmacists could effectively communicate and exchange information regarding discrepancies. This intervention improved the rate of MedRec and curbed down the in-hospital medication cost, too⁽²³⁾.

Conclusion

There is still a long way to go before cutting-edge computerized technology is available in every hospital. The High 5 SOP by WHO has mentioned some strategies that can

help improve MedRec. To begin with, educating the hospital staff is the stepping stone to the procedure's success. New staff members should be oriented regarding the importance of acquiring medication history from all patients when MedRec is conducted. There should be uniformity in everyone's procedure, and a strong communication thread should be woven.


Once the MedRec procedure is fully operational, regular monitoring should be carried out to check for consistency of the same, and feedback should be given to the in-charge personnel. Lacunae in the process should be identified, and strategies should be implemented to improve the efficacy, such as training the individual involved in committing the discrepancy or procedure redesigning. Coordination of each involved member will help to improve the process and subsequently help patient safety.

Conflict of Interest: Nil

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