



Received on 14 November 2025; received in revised form, 10 December 2025; accepted, 17 December 2025; published 01 April 2026

## A PROSPECTIVE INTERVENTIONAL STUDY TO MONITOR, EVALUATE AND IMPROVE THE MEDICATION RECONCILIATION PROCESS IN GERIATRIC INPATIENTS AT MAJOR TRAUMA CARE CENTRE BY THE INCORPORATION OF MATCH TOOLKIT – A CLINICAL PHARMACIST PERSPECTIVE

L. Britto Duraisingh <sup>1</sup>, Apollo James <sup>2</sup>, D. Jijitha <sup>2</sup>, S. Roshini <sup>2</sup>, S. Shafna <sup>2</sup> and X. Xerobin <sup>\* 2</sup>

Ganga Medical Centre and Hospital <sup>1</sup>, Coimbatore - 641043, Tamil Nadu, India.

Department of Pharmacy Practice <sup>2</sup>, Nandha College of Pharmacy, Erode - 638052, Tamil Nadu, India.

### Keywords:

Medication reconciliation, MATCH Toolkit, Clinical pharmacist, Geriatric inpatients, Medication errors and Drug discrepancies

### Correspondence to Author:

**X. Xerobin**

Pharm D Intern,  
Department of Pharmacy Practice,  
Nandha College of Pharmacy, Erode -  
638052, Tamil Nadu, India.

**E-mail:** xerobinx1@gmail.com

**ABSTRACT: Background:** Medication reconciliation is an essential step in ensuring patient safety, particularly among the elderly, who are more prone to medication-related errors. Discrepancies often occur during transitions of care due to incomplete communication or missing medication details. Clinical pharmacists play a key role in minimizing such errors by carefully reviewing and reconciling medications. **Objective:** This study aimed to evaluate and improve the medication reconciliation process in geriatric inpatients using the MATCH (Medications at Transitions and Clinical Handoffs) Toolkit and to highlight the contribution of clinical pharmacists in enhancing patient safety. **Methodology:** A prospective interventional study was conducted at Ganga Medical Centre and Hospital, Coimbatore, from February to July 2024, involving 600 inpatients aged above 50 years. Data were collected using the MATCH Toolkit and the Best Possible Medication History (BPMH). Discrepancies were categorized (A–D) based on their clinical importance and analyzed during admission, consultant review, internal transfer and discharge. Statistical analysis was done using QI Macros software. **Results:** Among the initial 400 cases, 71.5% showed medication deviations, which reduced to 21.5% after implementing the MATCH Toolkit. Most deviations were minor (Category A) and no serious errors (Category D) were found. The reduction was statistically significant ( $p < 0.05$ ). **Conclusion:** The introduction of the MATCH Toolkit, combined with active pharmacist involvement, significantly improved the medication reconciliation process and reduced discrepancies in geriatric trauma patients.

**INTRODUCTION:** Medication reconciliation (MedRec) is a globally recognized patient safety strategy designed to prevent medication errors and adverse drug events (ADEs) during transitions of care<sup>1-2</sup>.

Despite its inclusion in international quality standards, medication discrepancies at hospital admission, transfer, and discharge remain highly prevalent, particularly among older adults with multimorbidity and polypharmacy.

Inaccurate or incomplete medication histories, frequently resulting from fragmented healthcare records, time constraints, and reliance on patient or caregiver recall, continue to undermine the effectiveness of current medication management systems. These gaps contribute significantly to preventable morbidity, rehospitalization, and

<p><b>QUICK RESPONSE CODE</b></p>  <p style="font-size: small;">TORCG</p>	<p style="text-align: center;"><b>DOI:</b> 10.13040/IJPSR.0975-8232.17(4).1234-39</p> <hr/> <p style="text-align: center;">This article can be accessed online on <a href="http://www.ijpsr.com">www.ijpsr.com</a></p>
<p><b>DOI link:</b> <a href="https://doi.org/10.13040/IJPSR.0975-8232.17(4).1234-39">https://doi.org/10.13040/IJPSR.0975-8232.17(4).1234-39</a></p>	

increased healthcare costs<sup>3-5</sup>. Although medication history collection is a shared responsibility, evidence increasingly highlights that pharmacist-led medication reconciliation is more accurate and clinically impactful than routine reconciliation performed by non-specialist staff. Clinical pharmacists are uniquely equipped with pharmacotherapeutic expertise, structured interview skills, and the ability to identify drug-related problems, interactions, duplications, and contraindications<sup>6</sup>. However, in many healthcare settings, MedRec remains inconsistently implemented, with unclear professional roles and limited standardization, resulting in wide variability in outcomes. A critical research gap exists regarding the effectiveness of structured, toolkit-driven, pharmacist-led MedRec models in high-risk populations, particularly geriatric inpatients in trauma and tertiary care settings. Older adults are especially vulnerable to medication-related harm due to age-related pharmacokinetic changes, renal impairment, and complex drug regimens<sup>7-8</sup>.

While previous studies have demonstrated reductions in discrepancies, there is limited real-world evidence evaluating standardized frameworks such as the MATCH (Medications at Transitions and Clinical Handoffs) toolkit in resource-constrained, high-acuity environments.

**Need of Study:** This study is needed to reduce medication errors and adverse drug events among geriatric inpatients during care transitions. By identifying process gaps and implementing pharmacist-led reconciliation, it aims to enhance medication accuracy, communication and overall patient safety in a tertiary trauma care setting.

**Aims:** To evaluate, monitor and improve the medication reconciliation process in geriatric inpatients across various stages of care at a major trauma care centre.

#### **Objectives:**

- To assess the existing medication reconciliation process and identify key factors contributing to discrepancies in geriatric inpatients.
- To implement and evaluate the effectiveness of the MATCH Toolkit in improving the accuracy and efficiency of medication reconciliation.

- To analyze the role of clinical pharmacists in optimizing and sustaining improvements in the medication reconciliation process across different phases of care.

#### **METHODOLOGY:**

**Study Design:** A prospective interventional study utilizing the MATCH (Medications at Transitions and Clinical Handoffs) Toolkit.

**Study Site:** The study was conducted at Ganga Medical Centre and Hospital, Coimbatore.

**Study Period:** The study was carried out over a period of six months, from February 2024 to July 2024.

**Study Population:** A total of 600 geriatric inpatient cases were included in the study.

**Ethical Approval Number:** ECR/319/Inst/2013/RR-24

**Patient Consent:** We have collected consent response from all patients.

#### **Study Criteria:**

**Inclusion Criteria:** The study included geriatric inpatients of both genders aged above 50 years who were admitted to the hospital during the study period and had a hospital stay exceeding three days.

**Exclusion Criteria:** Patients who did not meet these criteria were excluded, including outpatients, individuals below 50 years of age and those admitted for daycare or short-stay procedures.

**Data Collection:** During the study period from February 2024 to July 2024, data were collected from various wards of Ganga Medical Centre and Hospital by following geriatric inpatients who met the inclusion criteria until their discharge. The study was structured into seven sequential steps in accordance with the MATCH Toolkit framework.

Data were gathered using a well-designed data collection form encompassing patient demographics, medical and medication history, prescribed drugs during different care transitions, comorbidities and factors contributing to deviations.

The Best Possible Medication History (BPMH) method was employed to obtain accurate information on patients' previous medical conditions, allergies and medications. Medication transcription accuracy was verified at each transition point to identify and quantify any discrepancies. The collected data and identified deviations were subsequently analyzed and utilized to enhance the medication reconciliation process through the systematic implementation of the MATCH Toolkit.

**Medication Deviations:** In this study, medication deviations were classified into four categories: A, B, C and D, based on their severity and clinical impact. Category A included harmless errors such as documentation or start date omissions, for example, incorrect dosing frequency of pantoprazole. Category B involved near miss errors that did not reach the patient, such as administration errors.

Category C represented clinically significant errors that reached the patient and required additional monitoring or pharmacist intervention, as seen with drugs like Clopilet, Folitrax and Acton OR. Category D referred to errors that could contribute to or result in death; no such cases were identified. These deviations were further analyzed across four hospital phases: admission, consultant review, internal transfer and discharge, to evaluate error patterns throughout care transitions.

**Steps of MATCH Toolkit:** The MATCH Toolkit was systematically applied through seven structured steps. Initially, an interdisciplinary team comprising diabetologists, physicians, physician assistants, secretaries and pharmacists was convened to coordinate the process. The existing medication reconciliation workflow was then mapped to verify, clarify and reconcile medications across care transitions. Potential areas for improvement were identified by defining responsibilities and pinpointing process deviations. A measurement strategy was established to quantify these deviations and perform root cause analysis. Based on the findings, corrective and preventive actions were designed to strengthen the medication reconciliation process. These changes were subsequently piloted in the facility through a structured action plan and finally, the effectiveness

of the implemented interventions was assessed by re-measuring and evaluating the outcomes.

**Statistical Analysis:** Data were collected using a structured data collection form and patient demographic details were tabulated and cross-tabulated using Microsoft Excel 2021 spreadsheets. Statistical analysis and relevant tests were carried out using SPC software QI Macros to evaluate deviations and measure improvements in the medication reconciliation process.

**RESULT & DISCUSSION:** In the present study of 600 geriatric inpatients aged above 50 years, males predominated (62.8%) over females (37.2%), with the majority of patients (56.5%) aged 50–74 years, followed by 34.5% in the 75–84 years group, and 9% aged  $\geq 85$  years. These findings are consistent with previous studies reporting male predominance among geriatric inpatients, such as a tertiary care hospital study in Delhi (56.4% male) and a rural Indian hospital study (65.6% male)<sup>9</sup>. The age distribution also aligns with prior research showing that the majority of geriatric inpatients fall within the younger-old category (60–75 years), while a smaller proportion represents very old patients ( $>85$  years), similar to ICU-based studies where patients above 80 years constituted 17–22%<sup>10</sup>. This comparison suggests that the demographic profile of the present cohort reflects typical geriatric inpatient populations in India, supporting the generalizability of the study findings and highlighting the importance of targeting high-risk older subgroups for pharmacist-led medication reconciliation interventions.

In your study, 286 of 400 cases (71.5%) showed medication-reconciliation deviations during the evaluation phase. This proportion is relatively high compared with several reports in the literature. A prospective observational study in elderly patients admitted to hospital reported that about 49.5% of patients (102 of 206) had at least one unintentional medication reconciliation error at admission<sup>11</sup>. Another single centre study among elderly inpatients in Vietnam found that 32.3% had at least one unintentional discrepancy on admission<sup>12</sup>. Meanwhile, a larger reconciliation audit from a Swiss hospital identified discrepancies in 63% of patients (420 of 670) at admission. On the other hand, there are studies reporting even higher

discrepancy rates<sup>13</sup>. In one multi-hospital review, 36–95% of patients had at least one discrepancy when MedRec was performed at admission, depending on hospital setting and personnel performing reconciliation<sup>14</sup>. **Table 1** shows that

distribution of deviated and non-deviated cases based on age category. **Table 2** shows that distribution of deviated and non-deviated cases based on admitting units.

**TABLE 1: DISTRIBUTION OF DEVIATED AND NON- DEVIATED CASES BASED ON AGE CATEGORY**

Category	Deviated Cases	%	Non Deviated Cases	%
Youngest old (50-74 yrs)	204	71%	78	68.4%
Middle old (75-84 yrs)	75	26.2%	28	24.6%
Oldest old (85 & above yrs)	7	2.5%	8	7%

**TABLE 2: DISTRIBUTION OF DEVIATED AND NON-DEVIATED CASES BASED ON ADMITTING UNITS**

Admitting Unit	Deviated Cases	%	Non Deviated Cases	%
Trauma	47	16.4%	28	24.5%
Arthroplasty	117	40.9%	49	42.9%
Arthroscopy	36	12.5%	13	11.4%
Plastic	35	12.2%	11	9.6%
Spine	51	17.8%	13	11.4%

**Table 3** shows that most deviations were due to missing critical instructions (26%), followed by dose errors (23%). A large cardiology-unit study, omission (*i.e.*, missing medications) accounted for 61% of unintentional discrepancies, while dose and timing errors constituted about 18.6% each, and route errors were less frequent (1.7%)<sup>15</sup>.

Similarly, a two hospital pharmacy led reconciliation audit found that the commonest discrepancies were omissions (71.8%), followed by wrong dose (12.8%) and wrong frequency (5.1%) among unintended errors<sup>16</sup>.

Meanwhile, a systematic review of discharge reconciliations noted that omissions remain the most frequent discrepancy, often accompanied by inaccuracies in route, frequency, or dose<sup>17</sup>.

**Table 4** shows that most deviations across all hospital transitions were low-risk Category A errors, with fewer Category B and C errors and no Category D errors at any stage. A systematic review of electronic assisted reconciliation interventions noted that most unintended discrepancies were minor in severity<sup>18</sup>.

A single centre low resource-setting study also found that while omissions and discrepancies were frequent, most were classified under low harm categories when using the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) index<sup>19</sup>. Another prospective observational study found that although

2066 discrepancies were identified among 180 inpatients, only a smaller subset (roughly 12%) constituted potentially harmful unintentional discrepancies, the majority being linked to pre-admission history taking rather than during discharge or transitions reinforcing that many reconciliation errors remain low-risk when detected early<sup>20</sup>.

**Table 5** shows a significant reduction in deviations from 71.5% in the evaluation phase to 21.5% in the improvement phase ( $p < 0.05$ ), indicating a statistically significant improvement. A pre-post study from Ethiopia showed the proportion of patients with at least one unintended discrepancy fell from 59% to 10.5% after pharmacist-led reconciliation ( $p < 0.001$ )<sup>18</sup>.

Similarly, another non-randomized controlled trial reported that a focused educational intervention for hospital pharmacists reduced medication discrepancies by 42.8% ( $p < 0.001$ )<sup>21</sup>. In a randomized controlled study including surgical patients, the number of unintentional discrepancies was significantly reduced from admission to discharge among those receiving pharmacist directed reconciliation ( $p = 0.002$ )<sup>22</sup>.

Moreover, an integrated pharmacist led reconciliation model in elderly patients undergoing transition from hospital to primary care achieved a 57.1% reduction in patients with post-discharge unintended discrepancies ( $p < 0.001$ )<sup>23</sup>.

**TABLE 3: DISTRIBUTION OF DEVIATED CASES BASED ON TYPES OF DEVIATION**

Types of Deviation	Number	%
Dose	91	23%
Route	61	15.3%
Duration	63	15.7%
Frequency	42	10%
Start date	41	10%
Special Information	102	26%

**TABLE 4: CATEGORIZATION OF DEVIATED CASES BASED ON DIVISIONS AT ADMISSION AND ON VISITING CONSULTANT'S ASSESSMENT, INTERNAL TRANSFER AND DISCHARGE**

Division	Admission		Consultant assessment		Internal transfer		Discharge	
	No. of deviation	%	No. of deviation	%	No. of deviation	%	No. of deviation	%
Category A	68	85%	94	74.6%	62	65%	65	67%
Category B	10	12.5%	30	23.8%	29	30.5%	29	29.8%
Category C	2	2.5%	2	1.5%	4	4.2%	3	3%
Category D	0	0	0	0	0	0	0	0

**TABLE 5: STATISTICAL ANALYSIS**

Cases	Outcomes value		Expected value		Chi square value	P Value
	First 400 Cases	Final 200 Cases	First 400 Cases	Final 200 Cases		
Deviated cases	286	43	219.33	109.67	134.59	0.05
Non-Deviated cases	114	157	180.67	90.33		
Total	400	200	400	200		

**CONCLUSION:** The study demonstrated a high incidence of medication deviations among geriatric inpatients, with the majority arising from incomplete medication instructions and dosing errors. Most of these deviations were classified as Category A, reflecting low clinical risk; however, a notable proportion still required timely pharmacist intervention to prevent potential adverse outcomes.

Implementation of the MATCH (Medications at Transitions and Clinical Handoffs) toolkit, integrated with active clinical pharmacist participation, resulted in a significant reduction in deviations from 71.5% during the evaluation phase to 21.5% in the improvement phase ( $p < 0.05$ ), underscoring the effectiveness of structured, pharmacist-led reconciliation strategies.

These findings emphasize the critical role of clinical pharmacists in ensuring accurate medication histories, improving interprofessional communication, and supporting safe transitions of care. Overall, the study highlights that systematic reconciliation processes, combined with interdisciplinary collaboration, can substantially enhance medication accuracy, minimize errors, and improve patient safety in tertiary trauma care settings.

**ACKNOWLEDGMENT:** We would like to thank our college principal, staffs and Dr Balavenkatasubramanian MD, DA Senior Consultant, Department of Anaesthesia, Ganga Medical Centre and Hospital, Coimbatore.

**CONFLICT OF INTEREST:** Nil

#### REFERENCES:

1. Institute for Healthcare Improvement. How-To Guide: Prevent Adverse Drug Events by Implementing Medication Reconciliation. Cambridge (MA): Institute for Healthcare Improvement 2011. Available at: [www.ihp.org](http://www.ihp.org)
2. Tam VC, Knowles SR, Cornish PL, Fine N, Marchesano R and Etchells EE: Frequency, type and clinical importance of medication history errors at admission to hospital: a systematic review. *CMAJ* 2005; 173(5): 510–5.
3. Mueller SK, Sponsler KC, Kripalani S and Schnipper JL: Hospital-based medication reconciliation practices: a systematic review. *Arch Intern Med* 2012; 172(14): 1057–69.
4. Roughead EE, Semple SJ and Rosenfeld E: The extent of medication errors and adverse drug reactions throughout the patient journey in acute care in Australia. *Med J* 2016; 204(2): 65–8.
5. World Health Organization. The High 5s Project: Standard Operating Protocol for Medication Reconciliation. Geneva: WHO 2014.
6. Agency for Healthcare Research and Quality (AHRQ). MATCH Toolkit for Medication Reconciliation. Rockville, MD: U.S. Department of Health and Human Services 2019.

7. Gleason KM, McDaniel MR and Feinglass J: Results of the Medications at Transitions and Clinical Handoffs (MATCH) study: an analysis of medication reconciliation errors and risk factors at hospital admission. *J Gen Intern Med* 2010; 25(5): 441–7.
8. Hammond DA, Smith MN and Painter JT: Drug–drug interactions between ritonavir-boosted nirmatrelvir (Paxlovid) and commonly used medications. *Pharmacotherapy* 2022; 42(8): 629–45.
9. Singh VJ, Roy V, Singhal S and Daga MK: Pharmacoconomics of medicines used for geriatric individuals in a tertiary care hospital in Delhi. *Indian J Med Res* 2024; 159(2): 143-152. doi: 10.4103/ijmr.ijmr\_2507\_21.
10. Huq AMU, Kumar S and Ambali AP: Clinical profile of 100 elderly patients admitted to critical care unit. *J Indian Acad Geriatr* 2023; 19(4): 203–206. doi:10.4103/jiag.jiag\_56\_23
11. Rodríguez Vargas B, Delgado Silveira E, Iglesias Peinado I and Bermejo Vicedo T: Prevalence and risk factors for medication reconciliation errors during hospital admission in elderly patients. *Int J Clin Pharm* 2016; 38(5): 1164-71. doi: 10.1007/s11096-016-0348-8.
12. Dong PTX, Pham VTT, Nguyen TT, Nguyen HTL, Hua S and Li SC: Unintentional medication discrepancies at admission among elderly inpatients with chronic medical conditions in vietnam: a single-centre observational study. *Drugs Real World Outcomes* 2022; 9(1): 141-151. doi: 10.1007/s40801-021-00274-3
13. Hellström LM, Bondesson Å, Höglund P and Eriksson T: Errors in medication history at hospital admission: prevalence and predicting factors. *BMC Clin Pharmacol* 2012; 12: 9. doi:10.1186/1472-6904-12-9
14. Stuijt CCM, van den Bemt BJB, Boerlage VE, Janssen MJA, Taxis K and Karapinar-Çarkit F: Differences in medication reconciliation interventions between six hospitals: a mixed method study. *BMC Health Serv Res* 2022; 22(1): 722. doi: 10.1186/s12913-022-08118-8
15. Lombardi NF, Mendes AE, Lucchetta RC, Reis WC, Fávero ML and Correr CJ: Analysis of the discrepancies identified during medication reconciliation on patient admission in cardiology units: a descriptive study. *Rev Lat Am Enfermagem* 2016; 24: 2760. doi: 10.1590/1518-8345.0820.2760.
16. Karaoui LR, Chamoun N, Fakhir J, Abi Ghanem W, Droubi S and Diab Marzouk AR: Impact of pharmacy-led medication reconciliation on admission to internal medicine service: experience in two tertiary care teaching hospitals. *BMC Health Serv Res* 2019; 19: 493. doi:10.1186/s12913-019-4323-7
17. Michaelsen MH, McCague P, Bradley CP and Sahn LJ: Medication reconciliation at discharge from hospital: a systematic review of the quantitative literature. *Pharmacy (Basel)* 2015; 3(2): 53-71. doi:10.3390/pharmacy3020053
18. Mekonnen AB, Abebe TB, McLachlan AJ and Brien JA: Impact of electronic medication reconciliation interventions on medication discrepancies at hospital transitions: a systematic review and meta-analysis. *BMC Med Inform Decis Mak* 2016; 16(1): 112. doi: 10.1186/s12911-016-0353-9.
19. Kovačević T, Nedinić S, Barišić V, Miljković B, Fazlić E, Vukadinović S and Kovačević P: The Role of the clinical pharmacist in hospital admission medication reconciliation in low-resource settings. *Pharmacy* 2025; 13(4):107. doi:10.3390/pharmacy13040107
20. Pippins JR, Gandhi TK, Hamann C, Ndumele CD, Labonville SA, Diedrichsen EK, Carty MG, Karson AS, Bhan I, Coley CM, Liang CL, Turchin A, McCarthy PC and Schnipper JL: Classifying and predicting errors of inpatient medication reconciliation. *J Gen Intern Med* 2008; 23(9): 1414-22. doi: 10.1007/s11606-008-0687-9
21. Aje AA, Showande SJ, Adisa R, Fakeye TO, Olutayo OA, Adebuseye LA and Olowookere OO: Effect of educational intervention on medication reconciliation practice of hospital pharmacists in a developing country - A non-randomised controlled trial. *BMC Med Educ* 2023; 23(1): 867. doi: 10.1186/s12909-023-04844-7
22. Abu Hammour K, Abu Farha R, Ya'acoub R, Salman Z and Basheti I: Impact of pharmacist-directed medication reconciliation in reducing medication discrepancies: a randomized controlled trial. *Can J Hosp Pharm* 2022; 75(3): 169-177. doi: 10.4212/cjhp.3143
23. Marinović I, Bačić Vrca V, Samardžić I, Marušić S, Grgurević I, Papić I, Grgurević D, Brkić M, Jambrek N and Mesarić J: Impact of an integrated medication reconciliation model led by a hospital clinical pharmacist on the reduction of post-discharge unintentional discrepancies. *J Clin Pharm Ther* 2021; 46(5): 1326-1333.

**How to cite this article:**

Duraisingh LB, James A, Jijitha D, Roshini S, Shafna S and Xerobin X: A prospective interventional study to monitor, evaluate and improve the medication reconciliation process in geriatric inpatients at major trauma care centre by the incorporation of match toolkit – a clinical pharmacist perspective. *Int J Pharm Sci & Res* 2026; 17(4): 1234-39. doi: 10.13040/IJPSR.0975-8232.17(4).1234-39.

All © 2026 are reserved by International Journal of Pharmaceutical Sciences and Research. This Journal licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

This article can be downloaded to **Android OS** based mobile. Scan QR Code using Code/Bar Scanner from your mobile. (Scanners are available on Google Playstore)