

A Prospective Observational Study of Medication Reconciliation at Admission, Transfer and Discharge to Reduce Medication Discrepancies in Inpatient

Hiren Rasikbhai Devani*, Charmiben Sunilbhai Patel, Mansi Chetan Modi

Department of Doctor of Pharmacy, Shree Dhanvantary Pharmacy College, Kudsad Road, Near Kim Railway-Station Kim (E), Olpad, Kim, Gujarat, INDIA.

ABSTRACT

Background: Medication reconciliation is the method in which patient's medication orders were compared to all the medications that the patient has been taking. This Reconciliation process for circumvent the medication discrepancies such as omission, drug interaction, duplications, or any medication related errors. Medication reconciliation ensures standard treatment for patients and also avoid harm from medicines is reduced. It is the baseline from which drug treatment is continued on admission, therapeutic interventions are made, and self-caring will be continued on discharge. **Objectives:** The primary objective of this study was to assess the prevalence and types of medication discrepancies found during medication reconciliation. The secondary objective was to determine the impact of medication reconciliation and to examine the potential severity of medication discrepancies also to find out drug's involvement in medication errors. **Methodology:** A prospective, observational study of medication reconciliation was done for 3 months in the inpatient department of the hospital. **Results:** A total 120 patients were included in this study, out of which 67(55.83%) were, male and 53(44.17%) were female. We found discrepancies in 45(37.50%) patients. Discrepancies were found at different transition points-At admission 34(57.36%) discrepancies identified, at transfer 4(6.78%) discrepancies identified, and at discharge 21(35.59%) discrepancies identified. **Conclusion:** Medication reconciliation process has a highly latent to recognize clinically important discrepancies for all patients. Medication reconciliation requires more focus in hospitals along with requirement for clinical pharmacy department for the medication safety.

Keywords: Medication reconciliation, Patient safety, Transitions of care, Medication discrepancies, Medication Error.

DOI: 10.5530/ijopp.15.3.35

Address for
correspondence:

Dr. Hiren Rasikbhai Devani,
Department of Doctor of
Pharmacy, Shree Dhanvantary
Pharmacy College,
Kudsad Road, Near Kim
Railway-Station Kim (E),
Olpad, Kim-394110, Gujarat,
INDIA.
Email id: devanihiren72@
gmail.com

INTRODUCTION

Medications are difficult to handle in the hospital as they are stopped, hold or changed in case of chronic condition and new medication can also be added to treat present condition. Especially transition care in the hospital are considered as the most difficult in managing patient medication which may elevate the risk of error at that time. As admission medications are provided as per the information given by the patient to the healthcare provider, therefore most of the discrepancies may occur due to miscommunication

between healthcare professionals, patient and caregiver at transition points. Medication discrepancies were defined as any unintended differences between the preadmission medication and medication given at hospital.¹ Around 50% of these errors mainly occur at admission and discharge,² out of which 30% discrepancies may cause potential harm to the patients.^{3,4} According to patient's condition medication prescribed to the patient at discharge are often different from preadmission medication which leads to discrepancies such as omission of drug or other unintentional discrepancies such



www.ijopp.org

as incorrect dose, incorrect frequency or therapeutic duplication.

To overcome this situation The Joint Commission-National Patient Safety Goal, Institute of Healthcare Improvement (IHI), World Health Organization (WHO) has suggested Medication Reconciliation process which helps in maintaining accurate list of patient medication by finding any unintentional discrepancies if present in the medication list.^{5,6} It is an interactive process of patient and healthcare provider in order to ensure the accurate transfer of information at interfaces of care.⁵ This process helps in identifying unintended discrepancies such as drug omission, therapeutic duplication, wrong dose or wrong frequency.

Medication Reconciliation ensures that patients are provided the right medicines with appropriate dose according to their current clinical presentation. It is also provide basic information like which medication is continued before admission, at now patient take medicine regularly or not which drug treatment is continued at discharge time. Medication reconciliation promotes healthcare and patient's communication.

Reconciliation of medication lists at transition points is a decisive step in improving patient safety and preventing patient suffering. Medication reconciliation can be considered an significant process that is helpful in providing proper care to the patient by identifying unintended medication discrepancies at transitions of care points.⁷ Acquiring an absolute Best Possible Medication History (BPMH) at hospital admission is a crucial step when a patient is admitted to the hospital. Because medication history upon hospital admission is usually wont to determine the medication regimen during hospitalization, any discrepancy during this history may end in a discrepancy during hospitalization. In addition, this further ensures the security of medication use since a medicine reconciliation process prospectively identifies and prevents various sorts of medication errors and drug interactions. Therefore, medication reconciliation on hospital admission or at patient transition points is an important element to prevent and minimize the adverse drug events.⁸

The Joint Commission has included reconciliation of medications across the continuum of care as a 2007 National Patient Safety Goal. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) patient safety goal implementation expectations states, "the organization with the patient's involvement creates a complete list of the patient's current medications at admission/entry".⁹

According to The Joint Commission – National Patient Safety Goal standard procedure for medication reconciliation includes-

- Obtaining the information of medication which the patient is taking at home prior to admission.
- Define the type of medication information to be collected from patient during 24 hr.
- Compare the preadmission medication information of the patient with medication ordered in the hospital to the patient to identify and resolve any discrepancies.
- Written information should be given to patients about medications that is to be continued after discharge.
- Explain the importance of managing the medication information after discharge.

This unintended discrepancy leads to development of other chronic condition, ADE, elevate hospital visits and may decrease treatment outcome. A prospective study of 180 patients was performed which showed that total 12% of unintentional discrepancies were found.¹⁰ According to one study, at least one error on admission were found in 64.5% of the patients out of which the 73.6% error found were omission of drug followed by differences in dose and frequency and at least one discrepancy was found in 32.37% of patient on discharge.¹¹ Most of the medication errors were found in patient admitted in general ward and ICU.¹²

As described in Figure 1 the process include collecting patient's medication history on admission through patient or relative interview and viewing patient documents after that reconciliation is to be done after transfer of patient to another department and finally reconciliation on discharge in order to avoid unexpected differences and errors during transition. Primarily obtaining the patient's medication list which the patient is currently taking, then defining the type of medication along with its dose, route, frequency and dosage form. Secondly, comparing the list with outpatient medication and providing the patient written information on discharge medication. In short, it includes collecting the information of outpatient medications, compares them with admission medications, and communicate it with caregivers if any errors arise.

These key steps must take place at each transfer of care, from start of admission, including any ward transfer, hospital transfer and on to discharge. It is a continuous cycle that involves good communication across the primary/secondary care interface.¹³

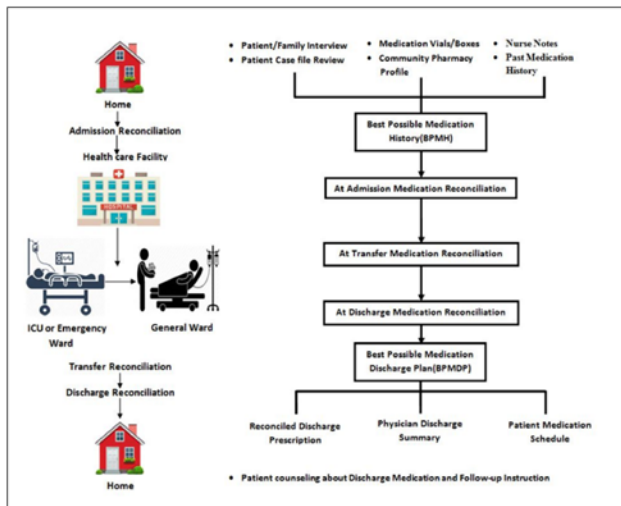


Figure 1: Process of Medication Reconciliation.

Medication reconciliation on admission

The primary care health team should be able to provide an accurate medication list for patients admitted during normal working hours. Repeat and recent acute medications should be regularly updated with any changes documented on the prescribing system in the GP Practice. On admission the medicine's reconciliation duty will be done by healthcare worker. Medicines reconciliation should be completed for every patient, regardless of their mode of admission.¹³

Medication reconciliation on transfer

Medicines reconciliation should again be undertaken when a patient is transferred between different care settings, e.g., from a critical care area to a general ward, or to another hospital. This will ensure that medicines are appropriately stopped, withheld, restarted or continued in order to the patients changing condition.

Medication reconciliation on discharge

Accurate and complete medicine's reconciliation on discharge will ensure the transfer of similar medication information between the care settings. The discharge prescription must contain an accurate list of all the medicines the patient is to take at home including the dose, formulation, route, frequency/timings, and duration.¹³ Any changes to medicines, along with the reasons for the changes, must be documented on the discharge prescription by medical staff and/or nurse practitioners or pharmacists, if appropriate.

Pharmacist along with other healthcare provider can contribute to mitigate medication discrepancies during transition care in the hospital. Clinical Pharmacist can

help in preventing unintentional medication error by taking proper history through reconciling medication of each patient at transition care. A study done on medication reconciliation shows that clinical pharmacist contribution acts positively on admission.¹⁴ A review article showed a significant decrease in medication variation in patients who have been through medication reconciliation as compared to the patient who were treated with usual care.¹⁵

Although medication reconciliation is fruitful process, there are some drawbacks of this process too. It demands a high labor time along with a high number of pharmacists, as it becomes difficult for a single pharmacist to reconcile each patient within 24 hr in a multi-specialty hospital. Also, it is quite difficult to collect medication history from the patient as it depends on the patient to provide accurate information.

However, medication reconciliation is considered to be standard through which medication discrepancies can be reduced. Our study primarily focuses to assessing the prevalence and type of medication discrepancies found through medication reconciliation and also the type of medications in which most frequent errors will be found.

METHODS

Study Design and Ethics Committee approval

A prospective, observational study was performed on medication reconciliation in inpatient (Admitted) department of the Hospital was conducted. The study was completed in the period of 3 months at a multi-specialty hospital in Surat in India. The Study was approved by Institutional Ethics Committee (IHEC approval No. SDPC/IHEC/03/2021) and Data collection permission was granted from Hospital advisory board for all participating students.

Study Criteria

Inclusion criteria

Inclusion criteria that was considered in the study was patient who have been admitted in the hospital, patient of age greater than 18 years, patient of any sex was included in the study and patient who is already having any comorbid condition and was using any drug prior to the admission. Minimum 24 hr of stay duration in hospital after admission was considered in order to complete the best possible medication history activity.

Exclusion Criteria

Patients of vulnerable population, unconscious, who are

not willing to participate, whose documents were missing, transferred to another hospital during ongoing treatment or those who were not able to provide history within 24 hr were excluded from the study.

Sample Size

A complete 120 patients take part in SDA Diamond Hospital, Surat, Gujarat, India were taken in the part of study.

The Sample size was calculated, guided by a Biostatistician professor from our institute, using the formula mention below;

$$n = \frac{z^2 \times p(1-p)}{e^2}$$

where, Sample size, z = confidence level, p = population proportion, e = margin of error

Data Collection

Data was collected in the data collection form from the patient's file and caretaker/relatives.

Data was collected in the data collection form. Primary outcomes of study were discrepancies related to drug, dose, route, frequency or mode of administration and secondary outcome was patient related i.e., decrease in medication discrepancies.

A data collection form was prepared which contained patient's demographic details, history of medication, medication chart at different transition points and also include discrepancies reconciliation. Prior to collecting data Consent form were signed from the patient. Data of each participant was collected from patient's medical records, clinical database and subsequently collecting patient's medication history from the patient or caregiver interview, patient case file, medication boxes, blister packs, nursing notes, hospital discharge summary etc.

The BPMH for each patient includes all information regarding pre-admission medication along with the dose and frequency for each drug, vitamins, herbal medication or non-prescription drugs or any drug or food allergies. BPMH process was done into two phases, primarily history was taken from patient's clinical records including hospital, primary care and outpatient records and information on previous hospital stays and specialist report. Next step, a Clinical Interview of the patient and/or caregiver was conducted for gathering data on non-prescription medication. Self-prepared medication lists and medication bags also reviewed if available. After

collecting data, medications were thoroughly reviewed for any unintentional medication discrepancies.

We checked for intended or unintended medication discrepancies. An intended medication discrepancy includes start new medication or any changes in dosage justified by new clinical status of the patients and unintended medication discrepancies involve wrong drug, wrong dose, wrong duration, wrong frequency, therapeutic duplication, interaction, etc. We compared preadmission medication with discharged medication for chronic condition. Ultimately, if discrepancies were found, they were mentioned into data collection form and reviewed.

Statistical Analysis

A illustrative analysis was done on variables. The mean, median and standard deviation were used for quantitative analysis. Results of qualitative variables were described in the form of graphs, frequencies and percentages. Chi Square was also used to find the correlation. All the statistical analysis was done in MS Excel (2008).

RESULTS AND DISCUSSION

120 In-patients were included in this study, out of which 67(55.83%) were male and 53(44.17%) were female out of which there were 10(8.33%) patients of age range between 20-40 years, 51(42.50%) patients of age range between 41-60 years, 43(35.83%) patients of age range between 61-80 years and 16(13.33%) patients of age range between 81-100 years. We found discrepancies in 45 cases out of 120 cases.

Identified Discrepancies at Different Transition Point

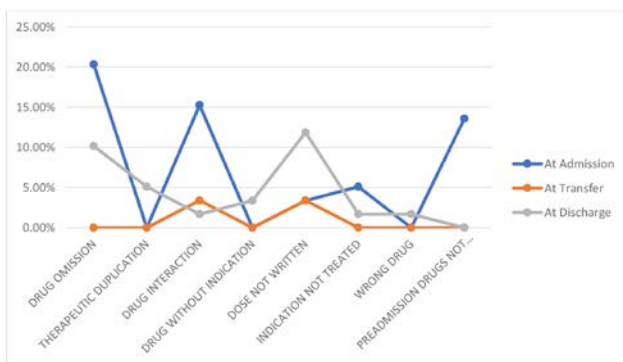
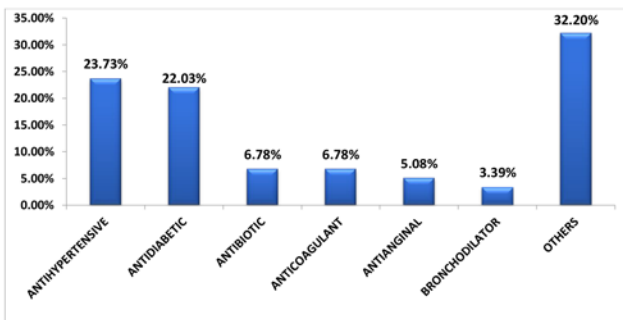
Discrepancies found at different transition points were as follows At Admission time 34(57.36%) Discrepancies identified, At Transfer time 4(6.78%) Discrepancies identified, At Discharge time 21(35.59%) Discrepancies identified.

Different Types of Observed Discrepancies -A total of 59 Discrepancies, included 10(16.95%) Dose Discrepancies, 47(79.66%) Drug Discrepancies, 2(3.39%) Frequency Discrepancies, 0(0.00%) Route Discrepancies were founded from MGW and SGW.

As shown in Figure 2 highest discrepancies were found at admission and during discharge. Most commonly found discrepancies at admission were of drug omission followed by drug interaction, preadmission drugs not

Table 1: Discrepancies at Admission, Transfer and Discharge.

Type of discrepancies	At admission	At transfer	At discharge
Drug Omission	20.34%	0%	10.17%
Therapeutic duplication	0%	0%	5.08%
Drug interaction	15.25%	3.39%	1.69%
Drug without indication	0%	0%	3.39%
Dose not written	3.39%	3.39%	11.86%
Indication not treated	5.08%	0%	1.69%
Wrong drug	0%	0%	1.69%
Preadmission drugs not continued	13.56%	0%	0%

**Figure 2: Comparison of Discrepancies at Admission, Transfer and Discharge.****Figure 3: Drugs Involvement in Discrepancies.**

continued and others. During discharge discrepancies that were observed the most was dose not written followed by drug omission and others.

Association of Drugs in Causes of Discrepancies:

The Result showed that in our prospective study, the most common drug groups displaying unintended discrepancies were antihypertensive agents (23.73%), followed by anti-diabetic (22.03%), antibiotics (6.78%), anticoagulants (6.78%), anti-anginal (5.03%) and bronchodilators (3.39%).

Using Chi-Square Calculation Assessment of Co-relation was done between Age and Discrepancies ($X^2(6, n=120) = 2.553, p=0.862$), Gender and Discrepancies ($X^2(2, n=120) = 1.486, p=0.476$), Ward and Discrepancies ($X^2(2, n=120) = 1.213, p=0.545$) and thus found that the result is independent of the Age, Gender and Ward.

DISCUSSION

Medication Reconciliation is considered as a useful process to lower medication discrepancies at different transition points during hospitalization.¹⁶ The standard process to perform medication reconciliation is yet to be established. However, many studies have shown the pros of medication reconciliation along with how effective the clinical pharmacist can contribute and suggesting the more demand of such services.¹⁴ Before considering that medication reconciliation is a standard process, we need to understand the strategy required to find medication discrepancies. Therefore, our study focuses in finding medication discrepancies through medication reconciliation.

Our study examined medication discrepancies at different transition points i.e., at admission, at transfer and at discharge. Although our concepts, methodology and design were different from other studies, but our result were consistent with them. The prevalence of medication discrepancies found on admission were higher than as compared to transfer and discharge. The involvement of pharmacist at every hospital setting may not be possible due to certain reasons, therefore our study only focuses on the prevalence and various medication discrepancies.

A systematic review also stated that the risks of medication errors declined by 75% in the patients who have received medication reconciliation.¹⁷ The medication reconciliation relies mainly on the history taking or Clinical interview of the patient on admission as many articles shows the greater risks of medication discrepancies/errors on admission which were solved by clinical pharmacist.¹⁴

Our study found the total 57 discrepancies in a sample size of 120 patients with 67 male and 53 female. We analyzed that >25% of the medication discrepancies occurred on admission, followed by 5% at transfer and 17.5% on discharge. Most common discrepancies found were of Drug omission (31.58%) which was similar to the previous studies which also shows the higher rate(61%) of drug omission during hospitalization on admission.¹⁰ We also have compared the patients who administer medications by themselves and those who were provided by caregivers.

We included a total of 120 patients, out of which we found discrepancies in 45 patients. All the baseline characteristics as mentioned in Table 1 were noted while collecting data. The discrepancies found during the studies were Drug Omission, Therapeutic Duplication, Pre-admission medication not mentioned, Dose not mentioned, untreated indication and others. Highest discrepancies found during our study were of drug omission especially on admission which were also observed in previous study.¹⁸⁻²⁰ These drug omissions were specifically patient related for e.g. A hypertensive patient discontinued the anti-hypertensive medication because he felt that his B.P. had come to normal. The drug omission type of discrepancies can be found effectively by pharmacist if proper history is taken on admission. Taking patient history on admission can help in decreasing the rate of harmful errors. A total of 72% discrepancies found were due to error in taking pre-admission medication history.¹⁰

Our study found that admission medication discrepancies (57.3%) were higher than as compared to transfer (6.76%) and discharge (35.59%). Differentiation of discrepancies on the basis of drug, dose, route and frequency was also done. The highest discrepancies found were of Drug discrepancies (79.66%), dose discrepancies (16.95%) and frequency discrepancies (3.39%). No serious discrepancies were found, however resolving the discrepancies will help in preventing future risks of serious or any fatal errors. Most of the discrepancies are of Drug Omissions (30.71%) which were generally all patient related which can be resolved by proper patient counseling on discharge.

We also correlated the discrepancies with age, gender and different wards, but no dependence was found. Thus, discrepancies found were independent of age, gender and wards included in this study. Drugs involved in discrepancies were also identified, which indicated that the highest rate of drugs involved was anti-hypertensive drug followed by anti-diabetic. The results were similar to other study which also found that the most common drug involved were cardiovascular drugs.¹

Based on the results of this study it can be justified that intervention can be made for the discrepancies found to reduce the risk of the serious or harmful errors in the future. However, more studies need to do to standardize the reconciliation process in order to be beneficial to the patients in the hospital.

CONCLUSION

A total of 120 patients who were hospitalized were included in the study, where medication reconciliation was done, had identified 45(37.50%) patients medication discrepancies and 75(62.50%) patients were not having any discrepancies. Discrepancies were found at different transition points, but discrepancies found during discharge were mostly not continuing preadmission medication, however patients were informed orally about continuing past medication. Medication reconciliation process is very helpful in finding out potential discrepancies.

However, this study needs further research and updates in order to standardize this process. It will be more helpful if done in collaboration with other healthcare workers. Implementing technology is also the useful option as for the detection and prevention purpose there is a process of computer-based reconciliation where discrepancies can be minimized and chances of prevention can be increased, according to many studies of electronic reconciliation, it shows greater knowledge of medication which leads to minimize the discrepancies.

To overcome medication/treatment related issues, medication reconciliation requires more focus in hospitals, in addition there is requirement for clinical pharmacy departments for the medication safety.

ACKNOWLEDGEMENT

Our Special thanks to Dr. Hareesh Pagoda (Hospital Administrator), SDA Diamond Hospital, Surat. Who gave the opportunity about practice and supported in whole research work.

Earnest thanks to our co-guide Dr. Nilesh Palsana (MD Physician) for his inestimable support.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

IHI: Institute of Healthcare Improvement **WHO:** World Health Organization **BPMH:** Best Possible Medication History **ADE:** Adverse Drug Event **SDA:** Surat Diamond Association **MRC:** Medical Research Center **MGW:** Medicine General Ward **SGW:** Surgical General Ward.

REFERENCES

- Unroe Kathleen Tschantz, Pfeifferberger Trista, Riegelhaupt Sarah, Jastrzembki Jennifer, Lokhnygina Yuliya, Colón-Emeric Cathleen. Inpatient medication reconciliation at admission and discharge: A retrospective cohort study of age and other risk factors for medication discrepancies. *AmJGeriatrPharmacother*. 2010;8(2):115-26. doi: 10.1016/j.amjopharm.2010.04.002, PMID 20439061.
- Sullivan Carol, Gleason Kristine M, Rooney Denise, Groszek Jennifer M, Barnard Cynthia. Medication reconciliation in the acute care setting: Opportunity and challenge for nursing. *J Nurs Care Qual*.2005;20(2):95-8. doi: 10.1097/00001786-200504000-00001, PMID 15839287.
- ViraT, Colquhoun M, Etechells E. Reconcilable differences: Correcting medication errors at hospital admission and discharge. *Qual Saf Health Care*. 2006;15(2):122-6. doi: 10.1136/qshc.2005.015347, PMID 16585113.
- Cornish Patricia L, Knowles Sandra R, Marchesano Romina, Tam Vincent, Shadowitz Steven, Juurlink David N, *et al.* Unintended medication discrepancies at the time of hospital admission. *Arch Intern Med*.2005;165(4):424-9. doi: 10.1001/archinte.165.4.424, PMID 15738372.
- Assuring medication accuracy at transitions in care standard operating protocol fact sheet [internet]; 2020. Who.int[cited2020]. Available from:https://www.who.int/patientsafety/implementation/solutions/high5s/ps_medication_reconciliation_fs_2010_en.pdf[cited21/3/2022].
- National patient safety goals effective. Vol. 2020;for the Hospital Program. Joint Commission.org.[cited 2020]. Available from: : https://www.jointcommission.org/media/tjc/documents/standards/national-patient-safety-goals/2020/npsg_chapter_hap_jul2020.pdf.cited21/3/2022].
- Mazhar Faizan, Akram Shahzad, Al-Osaimi Yousif A, Haider Nafis. Medication reconciliation errors in a tertiary care hospital in Saudi Arabia: Admission discrepancies and risk factors. *Pharm Pract*.2017;15(1):864. doi: 10.18549/PharmPract.2017.01.864, PMID 28503220.
- Tahir H, Ramagiri Vinod N, Daruwalla V, Umair Malik M, Zeeshan N, Vuppu L, *et al.* Decreasing unintended medication discrepancies in medication reconciliation through simple yet effective interventions. *AmJPublic Health Res*.2017;5(2):30-5. doi: 10.12691/ajphr-5-2-1.
- Lubowski Teresa J, Cronin Laurie M, Pavelka Robert W, Briscoe-Dwyer Leigh A, Briceland Laurie L, Hamilton Robert A. Effectiveness of a medication reconciliation project conducted by PharmD students. *Am J Pharm Educ*.2007;71(5):94. doi: 10.5688/aj710594, PMID 17998991.
- Pippins Jennifer R, Gandhi Tejal K, Hamann Claus, Ndumele Chima D, Labonville Stephanie A, Diedrichsen Ellen K, *et al.* Classifying and predicting errors of inpatient medication reconciliation. *J Gen Intern Med*. 2008;23(9):1414-22. doi: 10.1007/s11606-008-0687-9, PMID 18563493.
- Belda-Rustarazo S, Cantero-Hinojosa J, Salmeron-García A, González-García L, Cabeza-Barrera J, Galvez J. Medication reconciliation at admission and discharge: An analysis of prevalence and associated risk factors. *Int J Clin Pract*.2015;69(11):1268-74. doi: 10.1111/ijcp.12701, PMID 26202091.
- Buckley Mitchell S, Harinstein Lisa M, Clark Kimberly B, Smithburger Pamela L, Eckhardt Doug J, Alexander Earnest, *et al.* Impact of a clinical pharmacy admission medication reconciliation Program on Medication Errorsin "high-risk" patients. *AnnPharmacother*.2013;47(12):1599-610. doi: 10.1177/1060028013507428, PMID 24259613.
- The High 5-s Project Implementation Guide: AssuringMedication Accuracy at Transitions in Care- Medication Reconciliation
- Galvin Mairead, Jago-Byrne Marie-Claire, Fitzsimons Michelle, Grimes Tamasine. Clinical pharmacist's contribution to medication reconciliation on admission to hospital in Ireland. *Int J Clin Pharm*.2013;35(1):14-21. doi: 10.1007/s11096-012-9696-1, PMID 22972383.
- Mekonnen Alemayehu B, McLachlan Andrew J, Brien Jo-Anne E. Effectiveness of pharmacist-led medication reconciliation programmes on clinical outcomes at hospital transitions: A systematic review and meta-analysis.*BMJ Open*. 2016;6(2):e010003. doi: 10.1136/bmjopen-2015-010003, PMID 26908524.
- Mueller Stephanie K, Sponsler Kelly Cunningham, Kripalani Sunil, Schnipper Jeffrey L. Hospital-based medication reconciliation practices: A systematic review. *Arch Intern Med*.2012;172(14):1057-69. doi: 10.1001/archinternmed.2012.2246, PMID 22733210.
- Chiewchantanakit Daranee, Meakchai Anupong, Pituchaturont Natdanai, Dilokthornsakul Piyameth, Dhippayom Teerapon, Dhippayom Teerapon. The effectiveness of medication reconciliation to prevent medication error: A systematic review and meta-analysis. *Res Social Adm Pharm*.2020;16(7):886-94. doi: 10.1016/j.sapharm.2019.10.004, PMID 31607507.
- National Institute for Health and Clinical Excellence. (NICE)/National Patient Safety Agency (NPSA). Techpatient Saf Solut Med Reconciliation Admission Adults Hosp.
- Gleason Kristine M, Groszek Jennifer M, Sullivan Carol, Rooney Denise, Barnard Cynthia, Noskin Gary A. Reconciliation of discrepancies in medication histories and admission orders of newly hospitalized patients. *Am J Health SystPharm*.2004;61(16):1689-95. doi: 10.1093/ajhp/61.16.1689, PMID 15540481.
- Tam Vincent C, Knowles Sandra R, Cornish Patricia L, Fine Nowell, Marchesano Romina, Etechells Edward E. Frequency, type and clinical importance of medication history errors at admission to hospital: A systematic review. *CMAJ*. 2005;173(5):510-15. doi: 10.1503/cmaj.045311, PMID 16129874.