

**Medication Reconciliation Program in a Home Health Agency to Reduce Medication
Errors**

by

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Abstract

Problem: The lack of a standardized medication reconciliation process on patient admission to home health agencies (HHA) poses a risk to patient safety with the potential for negative health outcomes. An internal review of patient medication treatment plans at an urban HHA revealed a medication omission and dosage error rate of 4.8%. This resulted in unintended medication side effects and poor health outcomes. Elderly patients admitted to HHAs are more vulnerable due to lack of incomplete medication treatment plan at admission and standardized medication reconciliation as a result of care fragmentation, poor communication and care coordination among providers.

Purpose: The purpose of this quality improvement (QI) project was to implement a standardized evidence-based medication reconciliation tool, the Medication at Transitions and Clinical Handoffs (MATCH) process, to reduce medication omission and dosage errors upon patient admission to the HHA.

Methods: The MATCH process served as the implementation model for the standardized medication reconciliation process at the urban HHA. Competency based training was developed centered on the MATCH process and delivered to all clinical and administrative staff, as well as referral sources. QI project impact was measured using structural and process measures: the percentage of staff trained on new reconciliation process, percentage of patients admitted using the MATCH process, and percentage of patients with omissions and dosage errors.

Implementation tactics included the engagement of stakeholders and project champion, bi-weekly data sharing, weekly chart audits for compliance and development of run charts for data analysis and to monitor trends.

Results: The project was successful in achieving its primary goals. In week 1, 100% staff training and competency was achieved, while reconciliation using the new MATCH process was 100% achieved in Week 2 and the achievement was sustained for the remainder of the project. The omission and dosage errors were reduced to 0% in Week 5 and sustained throughout the remainder of the project with one anomalous data point in Week 10.

Conclusions: Standardized medication reconciliation based on MATCH process is effective in improving medication errors for homecare patients. Prioritization, management attention, and staff training/awareness of medication error problem were critical for successful implementation.

Background and Significance

The lack of standardized medication reconciliation process is a major health problem in the United States and affects millions of home health care patients annually. Preventable medication errors result in unintended adverse drug events, millions of unnecessary patient emergency room visits, nearly 10,000 preventable patient deaths per year, and cost the United States medical system about \$40 billion annually (Tariq et al., 2021). A systematic review and meta-analysis of medication error and medication harm found that 11% of elderly patients experienced medication harm, and that medication error occurs much more frequently than medication harm, since most errors do not lead to negative health outcomes (Hodkinson et al., 2020). An article published in the journal Patient Safety (Bethishou et al., 2020) reported that 67% of hospital patients faced unintended medication discrepancies. Moreover, 80% of medication errors caused by transitional care communication issues resulted from a lack of a standardized format, a distracted environment, and differences in communication styles among providers.

The current clinical practice at an urban home health agency (HHA) lacked a standardized medication reconciliation process for patients at the time of admission. An internal review of the HHA's patient medication treatment plans upon admission revealed an error rate of 4.8%. This has negatively impacted the agency patient health outcome data, increased cost and decreased the HHA's star rating.

Medication reconciliation is the process of compiling both post-acute care and pre-admission medication treatment plans into an updated, accurate, single medication treatment plan document. It involves cross-checking medication treatment plans to prevent medication omission and dosage errors. Medication at Transitions and Clinical Handoffs (MATCH) is an evidence-

based medication reconciliation process that has been shown to reduce medication error rates. Many of the patients at the HHA struggle with disabilities such as hearing loss, sight impairment, and language difficulty. These patients would benefit from accurate and safe medication reconciliation process when admitted to the HHA due to their vulnerability.

The purpose of this DNP QI project was to implement MATCH, a standardized evidence-based medication reconciliation process, to reduce medication omission and dosage errors upon admission to an urban HHA. The practice change implemented is a process, structural, and a quantifiable, outcome measures to improve medication reconciliation at the HHA.

Literature Review

A total of four articles were reviewed and synthesized for evidence to support the implementation of a standardized medication reconciliation process. The articles included one systematic review, one clinical protocol, an observational study, and a World Health Organization-sponsored analysis of medication error globally. The evidence synthesis found that elderly patients are the most vulnerable segment of the population to medication error and medication harm, and that structured medication reconciliation processes incorporated into the usual care provided by a healthcare provider was successful in reducing the incidence of medication error.

The evidence reviewed are shown in Table 1- Evidence Review, and Table 2- Evidence Synthesis. The Melnyk and Fineout-Overholt's (2014) and Newhouse's (2006) evidence rating scales were used to evaluate the level and quality of the evidence included in this review (Tables 3 &4). The level of evidence ranged between I and IV and the quality of evidence ranged between A and C.

Hodkinson et al. (2020) conducted a systematic review and meta-analysis of observational studies (retrospective and prospective cohorts; cross-sectional studies) in different medical care setting (primary, secondary and tertiary studies focusing on the incidence of medication error and medical harm caused by preventable medication errors. The authors reported that approximately 3% of patients (across all care settings and patient populations) experienced preventable medication harm, and that at least 25% of the medication harm was serious or life-threatening. Approximately 50% of all preventable medical harm was caused by medication errors. Among the elderly population (>65 years), the incidence of preventable medication harm was nearly 4 times that of the total population – 11% of the elderly population, and that this resulted from patients with multiple comorbidities and polypharmacy (more than 5 medicines at the same time). Medication error occurs much more frequently than medical harm because most medication errors do not result in medical harm to patients.

Gleason et al. (2010) in study funded by the Agency for Healthcare Research and Quality (AHRQ) found that improved medication reconciliation was an effective mechanism to combat the incidence of preventable medication errors. The study authors reported that nearly 36% of patients experienced medication errors, that 85% of errors resulted from patient medication records, and nearly half of the medication errors were prescription omissions. The study authors concluded that presenting a medication list or medication bottles at the time of admission reduced the incidence of medication errors. The study's authors highlighted the increased vulnerability of the elderly patient population with multiple comorbidities, who the most at risk for medication errors and medication harm and recommended that this patient population be prioritized when developing new and improved medication reconciliation processes.

In 2012, the AHRQ published a clinical process, entitled “Medications at Transitions and Clinical Handoffs” (MATCH), which provided an overview of the medication reconciliation process best practices across a variety of clinical settings. The MATCH process stressed the need to incorporate the medication reconciliation process into the standard operating processes to limit any backlash from staff who resist the new process as providing additional work without benefit to the patient. The MATCH process also stressed the importance of leadership buy-in as a critical determinant of success, and the definition of clear and easily understood roles for process participants. Staff and patient/caregiver education was highlighted as a critical component of a successful program. The World Health Organization (WHO) study (2007) generally supported the findings published in the MATCH process.

The World Health Organization study in 2007 identified lack of medication reconciliation as a significant threat to patient health and noted that structured medication reconciliation programs were effective in reducing the incidence of medication error. The AHRQ funded the Gleason et al. study in 2010, which found that structured medication reconciliation processes helped to reduce the incidence of medication errors. Two years later, the AHRQ provided support to Gleason and other authors to develop a best clinical practice protocol for medication reconciliation. The final report of this project was the publication of the Medications at Transitions and Clinical Handoffs (MATCH) clinical protocol, published in 2012.

The articles reviewed highlighted the magnitude of the issue for elderly patients, the primary causes of medication error, and the need for an evidence-based clinical intervention to address this chronic phenomenon. The MATCH process provides the evidence-based medication reconciliation process which was used as the basis of the clinical intervention at the urban HHA. It also provided guidance for process design and implementation.

Theoretical Framework

Helfrich's Conceptual Framework of Complex Innovation Implementation identifies several critical factors for project implementation success, to management support, financial support, innovation-values fit, project champion, formalized innovation implementation procedures, and an organizational climate supportive of innovation Figure 1. The proposed QI project, implementation of the MATCH tool for medication reconciliation at the HHA was supported by this innovation framework. The HHA management, clinical staff, and office personnel all understood the importance of the project and were supportive of the efforts to innovate to improve care. Lastly, preparation for the project has positioned the HHA to establish and implement formal innovation procedures to support this and future QI projects.

Ray's Theory of Caring provided the conceptual framework needed to support the QI project implementation at the point of care and to address all issues related to improving patient outcomes. Ray's theory consists of four key components – the person, health, environment, and nursing (Figure 2). These attributes encapsulate all aspects of the nurse/patient interaction. Nursing, according to Ray, consists of six steps – patient stimuli assessment, diagnosis, goal setting for patient health, intervention to achieve those goals, result evaluation, and behavior assessment. Implementation of MATCH follows this model, starting with the patient assessment (interview), where the nurse interviews the patient and compiles the medication treatment plan record. The second step, diagnosis, consists of applying the MATCH tool criteria to identify potential prescription omission and dosage errors. The third step involves establishing patient health goals based on the medication treatment plan and other care provided. The fourth step, intervention, involves reconciling patient medication treatment plans and resolving all

discrepancies. The fifth and sixth steps, results evaluation, and behavior assessment, are performed as part of the ongoing monitoring of patient health and outcomes.

Methods

The QI project was implemented at an urban HHA over 15 weeks between August and December 2021. A total of 109 patients were admitted to the agency during implementation period. The implementation team consisted of three clinical nurses, one Medical Director (CSR) and five administrative staff. The QI project included an ethnically diverse patient population with special consideration for disabled and vulnerable patients with disabilities such as hearing, sight impairment, and language difficulty. An evidence-based MATCH Tool Kit (AHRQ, 2012) guided the implementation of the standardized medication reconciliation process.

The project utilized specific structural, process, and outcome measures to evaluate implementation success and monitor innovation success over time. These measures helped identify areas that needed improvement and adjust implementation strategies accordingly. Staff performance was evaluated and feedback provided with rewards as needed.

The structural goal involved staff training/education and competency testing. Training progress was tracked through sign-in sheet and data tracking sheets. Strategies and tactics utilized to implement and achieve this goal included accountability, collaboration, use of project champions, and continuous staff retraining as needed.

The process measure involved the use of the standardized medication reconciliation process for all admitted patients to the agency, with a goal of 100% compliance. Implementation progress was tracked through the patient electronic health record (EHR) for all completed medication records reconciled. Strategies and tactics used to implement this goal included collaboration, accountability, data analysis with feedback to the nurses.

The outcome measures included percentage of patients with medication omissions and dosage errors. Implementation was tracked through review of medication reconciliations completed by the nurses. The strategies and tactics used to facilitate implementation included collaboration/communication with staff members, purposeful analysis of data on a weekly basis.

Data collection was captured manually and electronically through EHR. Medication treatment plan receipt data were tracked using a tracking sheet (Appendix A) and coding sheet (Appendix B). Medication reconciliation and error were tracked using a tracking sheet (Appendix C) and a patient record coding sheet (Appendix D). This information was then analyzed and coded by QI project lead with feedback provided to the implementation team. Staff training attendance and testing competency was collected via a sign-in sheet, compiled, and recorded by the project lead, (Appendix E) and staff training coding sheet (Appendix F). Same-day receipt of patient medication records was performed by the HHA intake staff using intake data sheets, analyzed by the QI project lead with feedback given to the implementation team. Staff education data, were collected through tracking sheet (Appendix G), learning objectives (Appendix H), and staff proficiency (Appendix J), analyzed by project lead and champion to establish staff competency. The Director of Marketing worked directly with the referral sources to ensure compliance with the same-day medication treatment plan receipt. All patient information was coded and stored in a separate, private computer with privacy screen, password protected, only accessible by the QI project lead, and a dedicated private workspace to maintain patient confidentiality and privacy. Prior to implementation, the QI project was submitted to the Human Research Protections Office at the University of Maryland and received a nonhuman research determination.

Results

Over the course of 15 weeks of project implementation, a total of 109 patients were admitted using the MATCH standardized medication reconciliation process. The process and structural practice change implemented included the adoption of a standardized medication reconciliation process to improve medication errors. This intervention addressed intake process, staff/referral source training, and staff performance monitoring. Evaluation of performance focused on four key measures –potential prescription omissions, dosage errors, percentage of patients who were admitted to HHA using the MATCH process, and percentage of staff trained on MATCH process.

The first two parameters monitored during the project were potential prescription omissions and dosage errors. A total of 109 patients were included in the standardized medication reconciliation process, and of these, three patients had dosage errors and four patients has potential prescription errors. All but one of the dosage errors took place during the first four weeks of project implementation. Data analysis of the medication omission using the run chart (See Figure 4) and dosage error (See Figure 5) revealed medication error of 12% during the first week of implementation with an anomalous data point at week 10. At week 5, zero medication error was achieved and maintained throughout the implementation period with horizontal data distribution. The earlier errors can be attributed to staff adaption to a new process. Two changes made during the first 3 weeks of project implementation included automation of data collection and re-education of referral sources. These critical adjustments ensured successful implementation and sustainability over time. Once these two changes had been implemented, the medication reconciliation process achieved 0% medication errors for the remainder of the project. The only exception, a medication dosage error in Week 10 due to medication transcription error.

The third parameter monitored during the project was the number of patients who were admitted to the HHA using the MATCH medication reconciliation process. During the first week of project implementation, two patients were not admitted using the new process as the referral took place. The run chart (See Figure 3) attained data stability with horizontal data distribution at week 3 and maintained throughout the implementation period. The fourth parameter monitored during project implementation was staff training. By week 1, 100% of staff training was achieved (See Figure 1).

Manual collection of performance data for the project emerged almost immediately as a significant barrier to project implementation. The significance of this barrier prompted the QI project lead to work with the Director of Nursing and Information Technology (IT) to automate the process. Automation of the data collection process involved incorporation of the data collection sheets into the agency's patient electronic health record (EHR). An unintended benefit of the project was the competitive advantage the new process provided to the HHA once implemented compared to other local providers, and an increase in patient referrals over time.

Project implementation identified three key insights during the first weeks of implementation. First, same-day receipt of patient medication treatment plans was essential to a successful and error-free medication reconciliation process. Second, incorporation of the medication reconciliation data collection into the existing electronic patient health record (EHR) promoted patient data/chart interface, rather than manual data collection. This enabled the project to gain clinical staff buy-in and ensure sustainability over time. Third, discussion of adherence to the new process with patient referral sources and clinical staff was critical to enable the project to gain credibility and to become adopted as the HHA clinical care standard.

Discussion

Implementation of a standardized medication reconciliation process at an urban HHA based on the MATCH process reduced the incidence of medication errors for admitted patients. The project achieved 0% medication errors which was an important internal HHA QI performance outcome. This QI project demonstrated that process standardization, communication/care coordination across multiple care providers, use of a standardized patient intake process, and education of referral sources were key factors in eliminating sources of medication errors that persist over time. Incorporation of the structured medication reconciliation process into the intake for new or transferred patients and electronic health record data collection processes were critical to gain buy-in from the clinical and administrative staff and to ensure sustainability over time.

The original QI project design assumed manual collection of medication reconciliation data since it had been determined that electronic collection was not feasible. Performance data was collected, reported to the project lead, coded to preserve patient privacy, and then analyzed and performance communicated to the clinical and administrative staff at the agency. Manual data collection hindered the project rollout and resulted in several instances of failure to adhere to the new process and/or introduction of medication error into the patient intake process during the first week of implementation. Once the problem had been identified, the Director of Nursing, the project lead and IT department modified the patient electronic health record to incorporate the new data collection requirement within the standard patient record interface. Also, referral source delay in transmission of patient medication treatment plans was identified as a major cause of medication error. The Marketing Director trained and re-trained the referral sources and their administrative staff in the new medication reconciliation process requirements. This

improved the process and resulted in same day receipt of medication treatment plan as the referral.

The results of this project supported the findings of previous research on medication reconciliation. The 2020 Hodkinson study found that elderly patients, the target patient population for this QI project are at a risk nearly four times higher than the general population (11% vs. 3%) for medication harm and that a quarter of medication harm was serious or life-threatening. The AHRQ-sponsored 2010 Gleason found that a structured medication process integrated into usual care reduced the incidence of medication errors in a statistically significant manner. The AHRQ built on this study to develop the MATCH medication reconciliation clinical protocol published in 2012, which was presented as a best practice for the U.S. healthcare system. The World Health Organization study from 2007 found that structured medication reconciliation processes reduced medication errors.

These same clinical trials which identified a statistically significant relationship between structured medication reconciliation processes and reductions in medication error rates failed in some clinical practice to show a link between medication reconciliation and improved patient health outcomes. This QI project did not attempt to address this latter question, given the duration of the project and the inability to monitor patient health outcomes post discharge from the HHA. In-addition, there were no observed differences between observed and anticipated outcomes.

Most of the QI project limitations were mitigated by the role of the QI project lead and project champion. The project implementation was limited to one of four HHA offices and conducted by most experienced nursing staff, a factor that contributed to the project success but

could pose a challenge for broader implementation. The scope of the project was limited to home care patients 65 years and older admitted during QI project implementation.

Conclusion

Implementation of medication reconciliation through a standardized evidence-based MATCH process has shown to be an effective practice change in reducing medication error among patients admitted to a HHA post-acute care. The QI project achieved zero medication errors at week 4 and maintained through week 15 of implementation.

Sustainability of project MATCH process is supported by the HHA's senior leadership of the high value of zero medication error to the HHA. The MATCH process will be sustained over time through the role of project champion, and office administrative staff, and HHA stakeholders. The incorporation of the medication reconciliation data sheet into the agency's EHR ensured continued common clinical practice standard among nurses. The QI project results were disseminated within the organization, agency's network providers, and other organization through podium poster presentation. The implications of this QI project for clinical practice included the implementation of MATCH Process to improve medication reconciliation, establish quantifiable goals and measurement data sheets to reduce medication errors. Improvement in clinical and non- clinical staff competency in the medication reconciliation process will also sustain its' continued use through incorporating into the HHA educational program.

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Table 1: Evidence Review Table

<p><i>Medications at Transitions and Clinical Handoffs (MATCH) Toolkit for Medication Reconciliation.</i> (2012). Ahrq.gov. https://www.ahrq.gov/patient-safety/resources/match/index.html</p>				<p>Level (Melnik) II</p>	
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
<p>The purpose of the toolkit is to provide practitioners with a validated methodology to reconcile patient medications and to provide caregivers with a step-by-step process to facilitate implementation.</p>	<p>The MATCH toolkit was based on clinical research, medication best practices, and other secondary sources related to the topic of medicine reconciliation.</p>	<p>N/A</p>	<p>Intervention: The intervention is led by the registered nurse. Implementation of the MATCH medication reconciliation methodology consists of the following steps, listed below:</p> <ol style="list-style-type: none"> 1. Gaining leadership support for the project 2. Defining project team and scope 3. Developing medication reconciliation process 4. Developing and Pilot-testing change through implementation 5. Educating and training staff on new process 6. Assessment and Process Evaluation. 	<p>Use of the MATCH toolkit and processes for medication reconciliation should result in the following outcomes, listed below:</p> <ul style="list-style-type: none"> - Fewer potential prescription omissions - Fewer dosage errors - Fewer adverse drug events - Fewer preventable hospital readmissions for patients within 30 days 	<p>The article found that implementation of the MATCH methodological steps improved:</p> <ul style="list-style-type: none"> - Staff training/Competency - Process efficiency - Improved Medication omission and dosage errors

Gleason, K. M., McDaniel, M. R., Feinglass, J., Baker, D. W., Lindquist, L., Liss, D., & Noskin, G. A. (2010). Results of the Medications At Transitions and Clinical Handoffs (MATCH) Study: An Analysis of Medication Reconciliation Errors and Risk Factors at Hospital Admission. <i>Journal of General Internal Medicine</i> , 25(5), 441–447. https://doi.org/10.1007/s11606-010-1256-6					Level IV
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
“The purpose of the study was to determine the risk factors and potential harm associated with medication errors at the time of hospital admission.”	Observational Study – Post-Facto review of medication treatment plans for errors and association with patient demographic and other risk factors	<p>The sample consisted of patients admitted to Northwestern Memorial Hospital in Chicago Illinois in 2006 and 2007.</p> <p>Patients were randomly selected from those admitted to the hospital from Monday to Friday during clinical pharmacist research time.</p> <p># Eligible: Not Provided</p> <p># Accepted: 651 patients</p> <p># Control: Not applicable</p> <p># Intervention: Not Applicable</p> <p>Power analysis: 88% power with a risk factor proportion of 0.20 and another patient group with a risk factor proportion of 0.35</p> <p>Group Homogeneity: Not applicable</p>	<p>Control: Not applicable</p> <p>Intervention</p> <p>The intervention involved a clinical pharmacist interviewing the patient and medication reconciliation at the time of admission.</p>	<p>Dependent Variable</p> <p>Risk factor associated with medication errors and the demographic profile of patients with medication errors vs. those who did not.</p> <p>Measurement tool (reliability), time, procedure:</p> <p>The primary measurement tool was the clinical pharmacist interview of patients, followed by the identification and classification of medication errors according to type and severity.</p>	<p>Statistical Procedures(s)</p> <p>Results were analyzed using a Chi-Squared test to compare the demographic attributes of those with medication treatment plan errors vs. those who did not.</p> <p>Results</p> <p>Nearly 36% of patients experienced at least 1 medication error, with the error rate of 5.4% of all medications prescribed (309 of 5,701). 85% of medication errors originated in patient medication histories. Age (>=65) (OR: 2.17, 95% CI 1.09-4.30) and number of prescriptions (OR: 1.21, 95% CI 1.14-1.29) were positively correlated with the incidence of errors.</p>
					Level

Hodkinson, A., Tyler, N., Ashcroft, D. M., Keers, R. N., Khan, K., Phipps, D., Abuzour, A., Bower, P., Avery, A., Campbell, S., & Panagioti, M. (2020). Preventable medication harm across health care settings: a systematic review and meta-analysis. BMC Medicine, 18(1). https://doi.org/10.1186/s12916-020-01774-9					
1					
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
The purpose of the study was to determine the prevalence, severity and nature of medication errors across a range of care settings.	<p>Systematic Review</p> English-language studies written between 2000 to 27 January 2020. No specific target population	<p>Search Strategy:</p> Searches were carried out in Medline, Cochrane library, CINAHL, Embase and PsycINFO from 2000 to 27 January 2020. No restrictions were placed on consideration of the studies. <p>Eligible Studies:</p> 81 studies were selected from 7868 studies identified by the original PRISMA search criteria. <p>Excluded:</p> No study exclusion criteria existed <p>Included:</p> Studies were included if they reference to medication error and were in the English language	<p>Control: Not applicable</p> <p>Intervention</p> Identification, categorization, and rating of level of severity of preventable medication harm in patients.	<p>Dependent Variable:</p> The purpose of the study was to determine the profile, frequency, and prevalence of preventable medication harm across patient care settings to establish a baseline for preventable medication harm.	<p>Level of Measurement</p> Systematic Review with meta-analysis The systematic review of evidence revealed that studies on the topic used a variety of methodologies to evaluate performance. The pooled prevalence for preventable medication harm was 3% (95% CI 2-4%) and for total medication harm was 9% (95% CI 7-11%). The highest incidence of preventable medication error was 11% (95% CI 7-15%) for elderly patient care settings.

<p><i>The High 5s Project Medication Reconciliation Implementation Guide.</i> (n.d). https://www.who.int/patientsafety/implementation/solutions/high5s/h5s-guide.pdf</p>				<p>Level (Melnyk) IV</p>	
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
<p>The purpose of this implementation guide is to provide practitioners with a validated methodology to Implement standardized medication reconciliation procedures to ensure medication accuracy at times of care transition (between departments, acute to home care setting, etc.)</p>	<p>The WHO care transition methodology is based on best practices in medication reconciliation based on clinical studies, practice guides, and other medical publications about best practices.</p>	<p>N/A</p>	<p>Intervention: project involves nurses observing and recording medication reconciliation as they occur during patient care.</p> <p>Implementation of the WHO medication reconciliation methodology consists of the following steps, listed below:</p> <ol style="list-style-type: none"> 1. Justify project implementation to organizational leadership 2. Defining participants – caregivers and patients 3. Medication reconciliation process development 4. Implementation & Testing/Refinement 5. Educating and training staff on new process 6. Scale up implementation 7. Assessment and Process Evaluation. 	<p>Dependent Variable:</p> <p>The primary performance metric used to measure medication reconciliation error include monitoring medication error frequency, defined as potential prescription omissions (PPOs) and dosage errors.</p>	<p>The article finds that the WHO medication reconciliation methodology resulted in:</p> <ul style="list-style-type: none"> - Fewer medication errors - Less frequent hospital readmission - Greater identification of non-life-threatening errors - Greater concern for accuracy of medication treatment plans

Table 2: Evidence Synthesis Table

Evidence Based Practice Question (PICO): For homecare patients 65 years and older, will a standardized medication reconciliation program reduce medication errors compared to the current agency practice?			
Level of Evidence	# of Studies	Summary of Findings	Overall Quality
I	I	The preventable medication error systematic review/meta-analysis across 81 studies and approximately 285,000 patients. The meta-analysis found that preventable medication harm occurred in approximately 1 in 30 patients and that a quarter of the preventable medication harm was severe or potentially life-threatening.	The study quality is good, since the systematic review covered 20 years of studies and involved approximately 285,000 patients across that period in 81 selected studies. Data were collected under similar criteria, which enabled the author to pool the results and arrive at useful conclusions regarding the prevalence, severity, and characteristics of preventable medication error/harm.
II	1	The MATCH study (2012) by the AHRQ devised a medication reconciliation best practices methodology for implementation in a variety of clinical care settings. The AHRQ established best practice principles to enable care providers to tailor implementation of the MATCH criteria to the specific care context of each practice.	The overall quality of the article followed existing best practice for study design, research, and evidence review. The authors of the article based their findings on extensive secondary research and review of existing medical literature on the topic. The study quality is good.
IV	2	<p>The MATCH study (Gleason et al, 2010), provided the clinical justification for the MATCH methodology as a best practice for medication reconciliation in a variety of healthcare settings.</p> <p>The World Health Organization study (High 5s, 2007) provided background research justifying medication reconciliation as a valid method to address incidence of medication errors.</p>	<p>The MATCH study quality is good, since it contained exhaustive research about medication reconciliation best practices across a range of different clinical settings.</p> <p>The WHO study was good since it included extensive research and pooled insights from around the world regarding the efficacy and utility of medication reconciliation as means to combat medication error.</p>

Table 3

Rating System for the Hierarchy of Evidence

Evidence Rating	Evaluation Criteria
Level I	Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs), or evidence-based clinical practice guidelines based on systematic reviews of RCTs
Level II	Evidence obtained from at least one well-designed RCT
Level III	Evidence obtained from well-designed controlled trials without randomization
Level IV	Evidence from well-designed case-control and cohort studies
Level V	Evidence from systematic reviews of descriptive and qualitative studies
Level VI	Evidence from a single descriptive or qualitative study
Level VII	Evidence from the opinion of authorities and/or reports of expert committees

From: Melnyk, Bernadette Mazurek, and Ellen Fineout-Overholt. [Evidence-Based Practice in Nursing & Healthcare: A Guide to Best Practice](#).

Table 4

Johns Hopkins Nursing Quality of Evidence Appraisal

Grade	Nomenclature	Definition for Research Evidence	Definition for Non-Research Evidence
A	High	Consistent results, sufficient sample size, adequate control, and definitive conclusions; consistent recommendations based on extensive literature review that includes thoughtful reference to scientific evidence	Expertise is clearly evident
B	Good	Reasonably consistent results, sufficient sample size, some control, and fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence	Expertise appears to be credible
C	Low/Major Flaw	Little evidence with inconsistent results, insufficient sample size, conclusions cannot be drawn	Expertise is not discernable or is dubious

From: Newhouse, Robin Purdy. [Johns Hopkins Nursing Evidence-Based Practice Model and Guidelines](#), p. 207.

Figure 1

Figure 1
Conceptual Framework of Complex Innovation Implementation

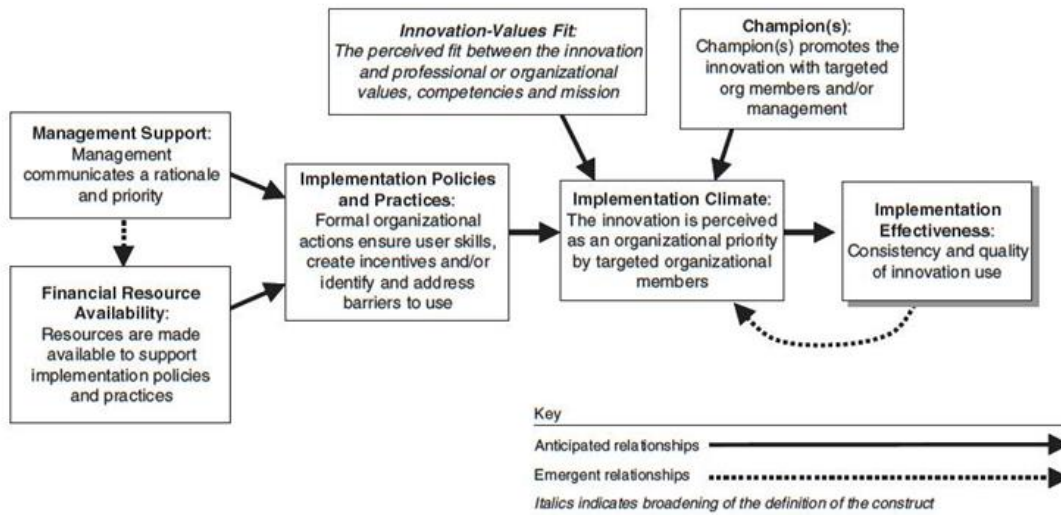


Figure 2

Ray's Theory of Caring

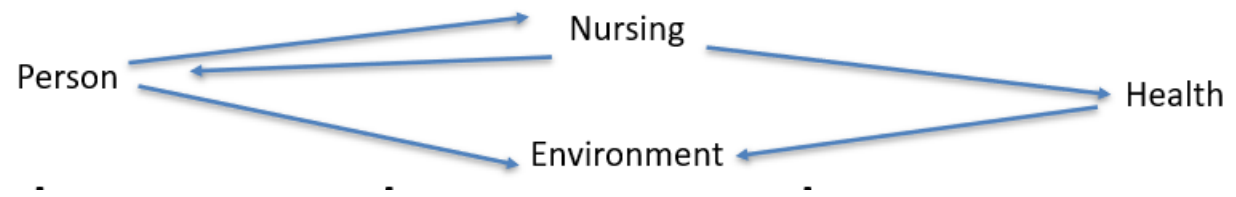


Figure 3

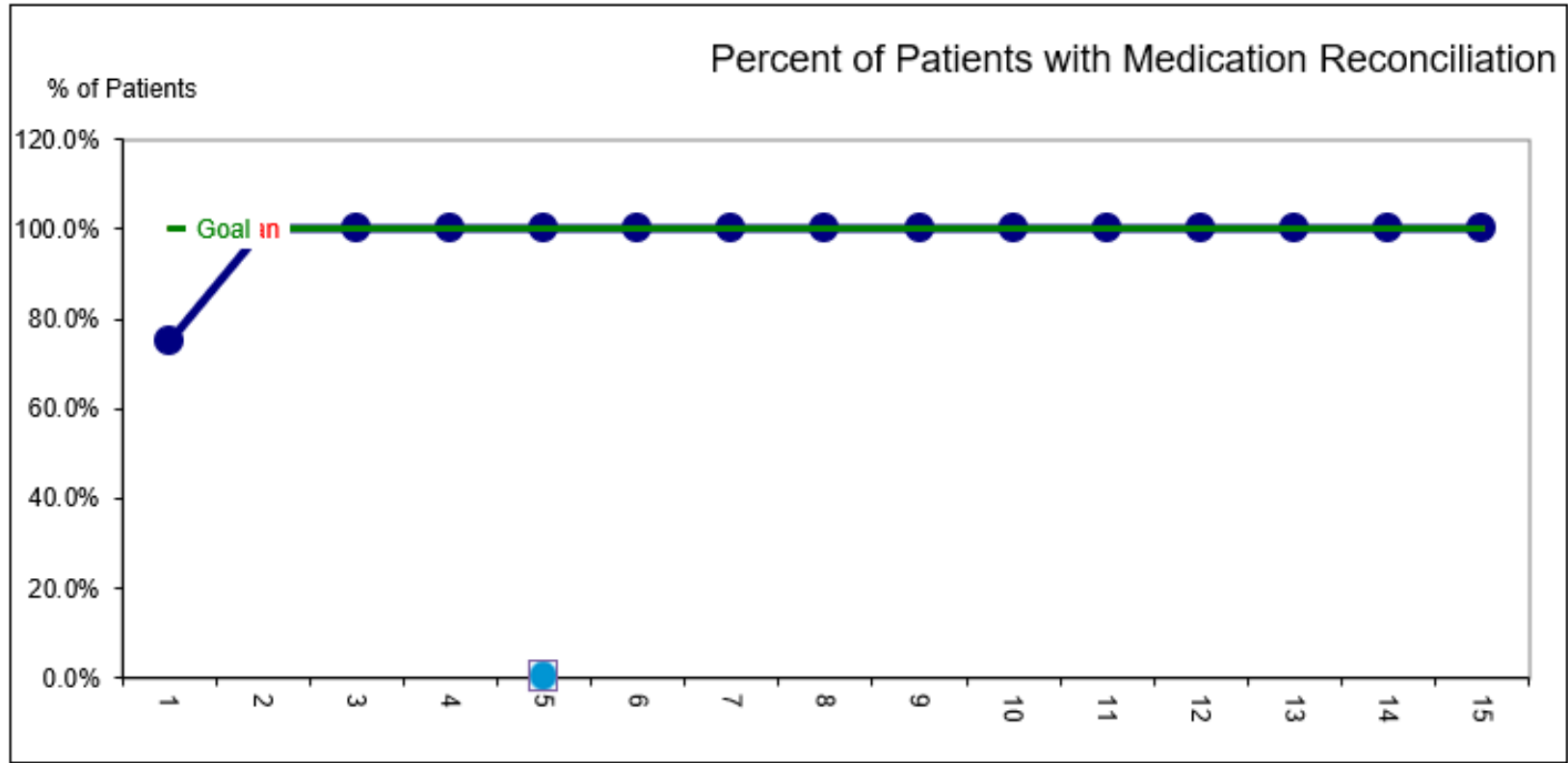


Figure 4

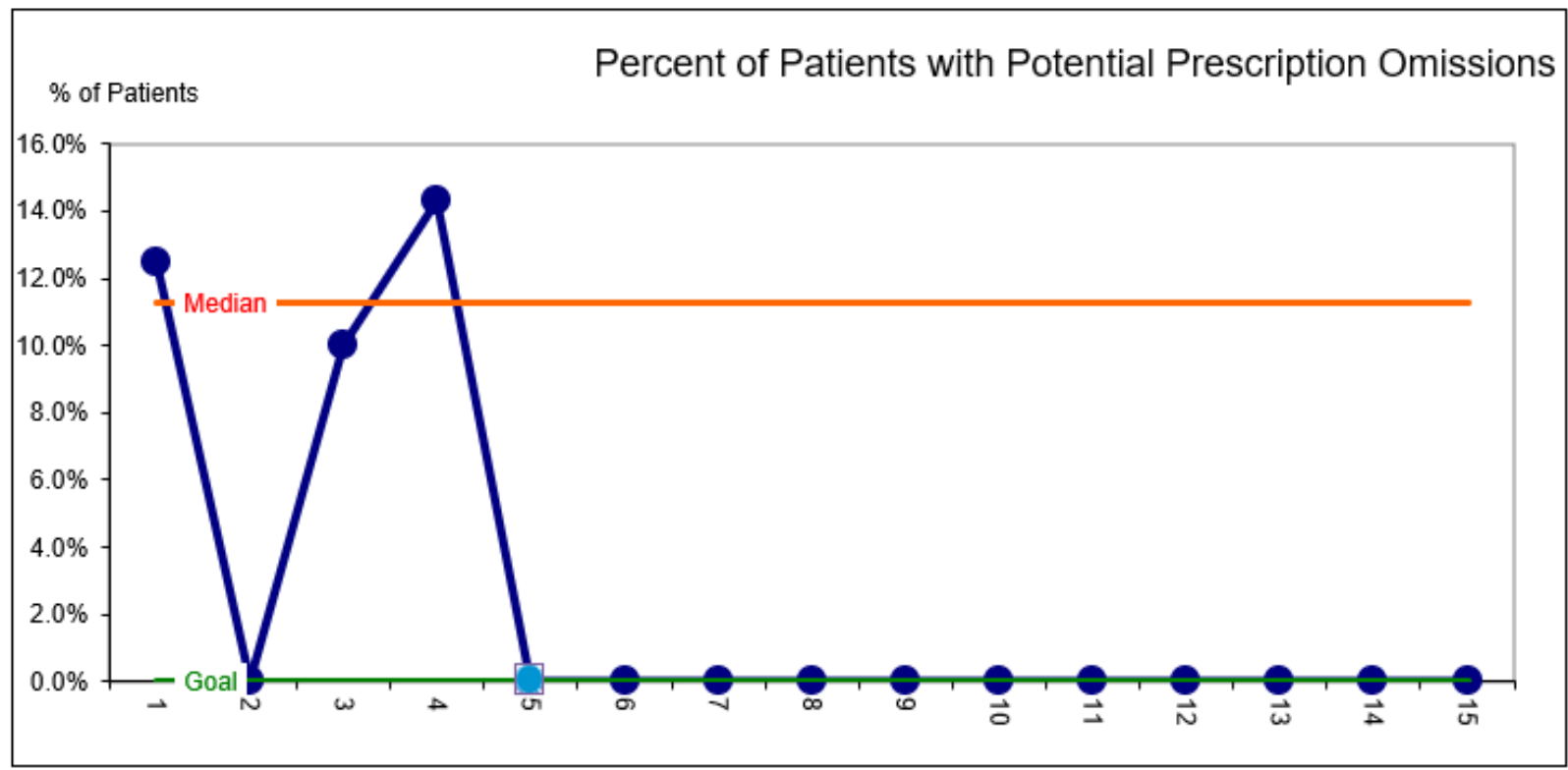
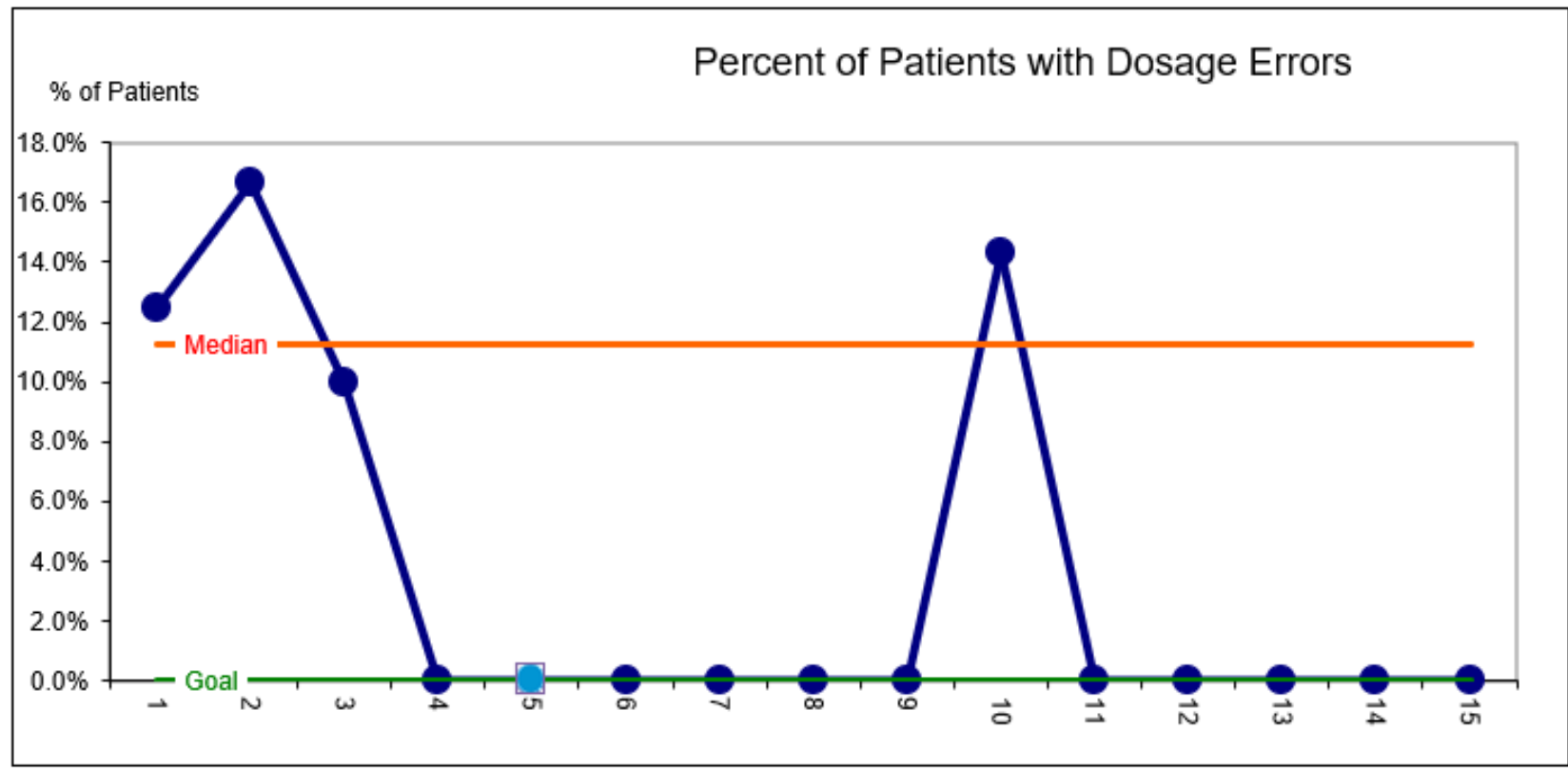


Figure 5



Appendix A

Patient Medication Treatment Plan Intake Tracking Sheet			
Patient Medical Record Code	Date of Intake	Medication Treatment Plan Received Same Day as Referral	Medication Treatment Plan Complete*
		1 = Yes, 2 = No	1 = Yes, 2 = No
* Patient Medication Treatment Plan refers to the transmission of 100% of medication record for the patient during the same day as the referral.			

Appendix B

Patient Medication Treatment Plan Intake Coding Sheet	
Patient Medical Record Code	Patient Medical Record Number

Appendix C

Patient Medication Treatment Plan Error Tracking Sheet				
Patient Medical Record Code	Medication Reconciliation Completed *	Medication Errors	Potential Prescription Omission (PPO)	Dosage Error
	1 = Yes, 2 = No	1 = Yes, 2 = No	1 = Yes, 2 = No	1 = Yes, 2 = No
* Medication Reconciliation refers to the compilation of post-acute care medications and the pre-admission medication treatment plans into a single document and the cross-checking of the two lists to address medication omission and dosage errors.				

Appendix D

Patient Medication Treatment Plan Error Coding Sheet	
Patient Medical Record Code	Patient Medical Record Number

Appendix E

Staff Education Data Spreadsheet			
Staff Code	Training Date	Training Completed	Proficiency Exam Passed
		1= Yes, 2 = No	1= Yes, 2 = No

Appendix F

Staff Education Coding Sheet		
Staff Education Code Key		
Staff Code	Staff Name	

Appendix G

Staff Education

1. Educational Program objectives
 - By the end of the training section participants would have gained knowledge about:
 - Definition of medication reconciliation
 - Medication reconciliation process (MRP)
 - Patient Transitional Care Model (TCM)
 - The role the MATCH Tool in preventing medication errors
 - Staff education on medication reconciliation processes
 - Data management
 - Patient / Staff privacy and confidentiality
2. Curriculum – see below
3. Strategies and timeline for implementation- as outlined the project design
4. Learning objectives
 - Intake staff / admission nurse will gain an in-depth knowledge about medication reconciliation process
 - Intake staff will obtain medication treatment plan same day as the referral
 - Admission will complete medication reconciliation at time of admission of all new patients
 - Complete all necessary data management Tools
 - Educate all stakeholders to the medication reconciliation program for continuous evaluation and sustainability
5. Content outline – see below
6. Method of instruction - one-on-one teaching instruction
7. Time spent- About an hour per section
8. Method of evaluation - Pre / Post Test

Appendix H

Home Health Care Medication Reconciliation Education Program

Topic: Medication Reconciliation Process Improvement

Education Training Program Outline

- 1) What is Medication Error?
 - a) Potentially Inappropriate Prescriptions (PIP)
 - b) Potential Prescription Omissions (PPO)
 - c) Dosage Errors
 - d) Other Errors

- 2) Why does it matter?
 - a) Preventable medication errors result in an estimated 10,000 deaths annually in the USA
 - b) Hundreds of thousands of Adverse Drug Events and Unreimbursed hospital readmissions

- 3) Medication Error and Home Care – Why so Important
 - a) 40% of all medication errors take place during transitions from hospitals / referral sources
 - b) 70% of these medication errors are preventable
 - c) Transition of care from one point to the next level of care (Home Care) –
 - i) Care Fragmentation
 - ii) High Error Rates
 - iii) Inadequate Support
 - d) Home Health Agency as part of the cycle of care:
 - i) Patient / family & care giver medication education
 - ii) Medication care coordination / communication among providers

Appendix I

Learning Objectives	Content Outline	Method of Instruction	Time Spent	Method of Evaluation
<p>Objective 1</p> <p>By the end of this learning objective,</p> <p>Intake staff will be proficient in the new Medication Treatment Plan Intake Process</p>	<ul style="list-style-type: none"> ➤ Description of the intake process ➤ The elements of complete discharge medication treatment plan. ➤ Standardized process for interactions with referral sources. ➤ Standardized process for same day medication treatment plan transmitted to the admission nurse prior to first patient visit. 	<p>PowerPoint/Lecture</p>	<p>4</p>	<p>Pre/Post Test</p>
<p>Objective 2</p> <p>By the end of this learning objective:</p> <p>All admission nurses will be proficient in the new standardized medication Reconciliation Process</p>	<ul style="list-style-type: none"> ➤ Description of the medication reconciliation process ➤ Medication treatment plan reconciliation process from intake staff to admission nurse. ➤ Standardized process for compilation of medication treatment plan from discharge medication list. ➤ Interview/information gathering process for medication information with patient/ caregiver during admission visit. ➤ process for reconciling discharge medication list with pre-admission lists and identifying omission and dosage error 	<p>PowerPoint/Lecture</p>	<p>8</p>	<p>Pre/Post Test</p>
<p>Patient Medication Error Awareness Training</p>	<p>Review importance of medication errors as a preventable source of hospital readmissions, adverse drug events, and poor health outcomes.</p>	<p>PowerPoint/Lecture</p>	<p>4</p>	<p>Pre/Post Test</p>

Appendix J

Pre /Post medication reconciliation questions. Staff must answer 8 out of 10 correctly to pass/ to be deemed competent.

Questions and Answers- where are the answers? Also why are you double lettering the questions?

1. Why is medication reconciliation important?

- A. Medication discrepancies occur most often at transitions in care - admission, transfer and discharge
- B. Medication discrepancies are common and can cause adverse events
- C. Approximately 50% of patients will have at least one discrepancy between home meds and meds ordered in hospital
- D. At least one third of discrepancies have the potential to be clinically important resulting in harm
- E. All of the above

2. True or False: Medication reconciliation is a safety best practice designed to minimize the potential for adverse events related to medication discrepancies.

- A. True
- B. False

3. What is the most important type of medications that nurses should inquire about?

- A. Vitamins
- B. Over-the-counter medications
- C. Herbal products
- D. Prescription medications
- E. All of the above

Question Answer key

1. E
2. A
3. E