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Medication Reconciliation in an Ambulatory Care Community Mental Health Practice

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Medication Reconciliation in an Ambulatory Care Community Mental Health Practice

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Abstract

Medication errors and adverse drug reactions are prevalent across the healthcare continuum.

As many as 4.6% of deaths in the United States may be the result of an adverse drug reaction,

making them one of the top five leading causes of death. Accurate medication reconciliation is

one method to help protect patients from adverse medication reactions. Medication

reconciliation is a formal process that is used by health care providers to gather a complete and

accurate medication list to identify discrepancies, inform prescribing decisions and identify and

prevent medication errors. This DNP project involved the implementation of an evidence-based

medication reconciliation protocol with a sample of twenty-five patients at a community-based

outpatient psychiatric practice in Western Massachusetts. Results indicated that there were a

significant number of both prescribed and over the counter medications missing from the

patient's electronic medical record medication profile as well as a high number of potential drug

interactions. Staff education about the process of medication reconciliation was an important

aspect of this project.

Medication Reconciliation in an Ambulatory Care Community Mental Health Practice

Whether admitted to an inpatient facility or as an outpatient in a medical practice, the importance of maintaining accurate medication lists cannot be understated. With the majority of medication, errors occurring during transitions of care between providers (Nassaralla, et al., 2008) patients in outpatient practices are left vulnerable to errors. Psychiatric patients are particularly susceptible as it not uncommon for them to be on combinations of both psychiatric and general medical drugs to treat both mental illness as well as comorbid medical conditions (Simoons, et al., 2016).

Background

Adverse Drug Events

Medication errors and their potential associated adverse drug events are a serious problem in acute care facilities, skilled nursing facilities, provider practices and in the home. Adverse drug events (ADE) account for nearly 700,000 emergency department visits and 100,000 hospitalizations each year, and they affect nearly five percent of hospitalized patients which makes them one of the most common types of inpatient errors. Due to lack of structured reconciliation processes, ambulatory patients may experience ADEs at even higher rates (Agency for Healthcare Research and Quality [AHRQ], 2015). Adverse drug reactions cost $136 billion yearly which is an amount that is greater than the total costs of cardiovascular or diabetic care (U.S. Food and Drug Administration, 2016). The highest risks for discrepancies occur during discharge from acute care facilities to home where studies estimate that anywhere from 14.1% to 94% of patients experience at least one medication discrepancy (Fuji, M, & Abbott, 2014). As many as 4.6% of deaths in the United States may be the result of an adverse drug reaction, making them one of the top five leading causes of death (Bourgeois, Shannon, Valim, & Mandl,

2010).

With lengths of stay in U.S acute care hospitals steadily decreasing since 1960 (Kalra, Fisher, & Axelrod, 2010), the reliance on outpatient providers for disease management and prescribing has increased. More than 80% of adults in outpatient settings report using at least using one medication, and approximately 70% of outpatient clinic visits in the United States have been associated with the prescription or continuation of a medication. In addition, the proportion of patients taking five or more medications more than doubled between 1995 and 2005 (Bourgeois et al., 2010).

With increasing use of prescription medications, polypharmacy as well as an increasing elderly population (ADEs have increased among patients 65 years and older with as many as one in twenty persons seeking medical care for an ADE), the potential risk of ADEs has also increased. Findings from an 11-year national study on adverse drug events revealed that overall, outpatient adverse drug reactions resulted in a mean yearly total of 107,468 hospital admissions. Therefore, measures must be developed to monitor and prevent ADEs in the outpatient population (Bourgeois et al., 2010).

Barnsteiner (2008) summarized findings from two studies that addressed discrepancies in outpatient medical records: Among the findings, one study reflected discrepancies in 26.3% of charts of patients who were requesting precription medications; of those, 59% involved omitted medications from the electronic list. A second study in an ambulatory family practice found that among the 76% of patients in the practice who had medications prescribed, 87% of the charts had incomplete or missing documentation of those medications.

As mentioned previously, psychiatric patients are particularly susceptible to medication errors. In a study of medication reconciliation, Simoons, et al., (2016) found at least one

discrepancy in 94.8% of patients among four outpatient departments for mood and anxiety disorders with almost twenty-three percent of all discrepancies having the potential to cause "moderate to severe discomfort or clinical deterioration, affecting almost half of all patients" (p. 1516).

Medication Reconciliation

The Institute of Medicine (2001) defined *The Six Domains of Health Care Quality*, and one of those aims was that health care must be safe. Providing safe care involves avoiding harm to patients from the care that is intended to help them (AHRQ, 2001). Accurate medication reconciliation is an essential process in helping protect patients from adverse drug events and keeping patients safe. Medication reconciliation is such an important process that the World Health Organization named it as one of five top patient safety strategies (McCarthy, et al., 2016).

Medication reconciliation is a formal process that is used by health care providers to gather a complete and accurate medication list (both home and prescribed) to identify discrepancies, inform prescribing decisions and identify and prevent medication errors (AHRQ, 2013). The design of medication reconciliation centers around the concept of creating a single list of the patient's current list of medications which AHRQ (2012), describes as the "one source of truth." that can be accurately shared and utilized by all physicians, nurses, pharmacists, and others caring for the patient. "The reconciling process has been demonstrated to be a powerful strategy to reduce medication errors as patients move from one level of care to another" (IHI, 2011, p. 6).

When medication reconciliation cannot be performed in the medical office, it may be necessary to execute it in the patient's home. This is especially important when a patient is homebound due to multiple medical comorbidities. Fuji, M, & Abbott (2014) suggest that when

medications have to be reconciled in the home, a timeline should be set for completion of the process, a time should be set for when the process shall occur, a checklist and forms should be created as needed to guide the process.

Problem Statement

Medication errors and adverse drug events (ADE) cost billions of dollars a year, lead to readmissions and increased lengths of stay, and most importantly, cost patient lives. The risk of adverse outcomes increases with absent, incomplete or inaccurately completed medication reconciliations. The quality improvement project proposed, involves the implementation of an evidence-based protocol to improve the process of medication reconciliation in an outpatient psychiatric practice.

Organizational "Gap" Analysis of Project Site

The location for this quality improvement project was a community-based outpatient psychiatric practice in Western Massachusetts where the majority of patients are adults, many of whom have comorbid medical conditions. The current medication reconciliation process at this practice is inefficient. Licensed Social Workers (LICSW) and therapists collect medication information when they complete an initial intake with a patient in the office or on subsequent visits in the patient's home. Most of the social workers and therapists have no medical background and thus, do not always put much emphasis on the mediation reconciliation portion of the intake. Social workers and therapists also have no training in the area of pharmacology, so it's difficult for them to identify, properly categorize or select the correct formulation of each medication in the list (caps, pills, liquid). If a medication list is incomplete on the first visit to a practice, if it is not reconciled correctly on a subsequent visit, the medical record remains incorrect and opens a patient up to the potential risk of adverse outcomes.

Review of the Literature

Databases and sites searched in this literature review (see Appendix C) included CINAHL, PubMed, Agency for Healthcare Research and Quality (AHRQ) and Institute for Healthcare Improvement (IHI). Keywords used included medication reconciliation, outpatient, psychiatric, ambulatory care with inclusion criteria 2008-2017 and English language. For purposes of this draft, five studies and two evidence-based protocols were chosen from the IHI and the AHRQ.

Nassaralla, et al., (2008) and (Keogh, et al., 2016) conducted studies based on the implementation of interventions to improve medication reconciliation completion compliance in ambulatory care settings. Nassaralla, et al., (2008) implemented their intervention and conducted their study across four academic, ambulatory primary care clinics. Before the intervention, baseline data that assessed the completeness, correctness and accuracy of medication documentation in the electronic health record (EHR). Interventions that included staff training and patient education to increase awareness were implemented. Completeness of medication lists improved from 20.4% pre-intervention to 50.4% post-intervention, and patient participation in the medication reconciliation process increased from 13.9% to 33%; lastly, medication list accuracy improved from 11.5% to 29%.

Keogh, et al., (2016) implemented a 24-month medication reconciliation improvement process across 148 ambulatory care practices in one health care system. Three levels of interventions that centered on staff education were implemented; a more intensive intervention was implemented at 65 specialty practices; a modified approach was implemented at 71 other specialty practices, and a less intensive approach was used at 14 primary care practices. The level of intervention varied based on practice infrastructure and prescription rates. Two

measures were used: measure one, the percentage of <u>active</u> medications prescribed by that provider that were reconciled and measure two, how often <u>all</u> medications that were prescribed by the provider were reconciled. From pre to post-intervention, measure one improved from 71% to 90% in specialty practices and from 62% to 91% in primary care practices. Measure two across all ambulatory practices increased from 81% to 90%. All interventions, which focused heavily on staff education as well as better informing patients about the medication reconciliation processes, showed improved outcomes.

Milone, Philbrick, & Harris, (2014) included a pharmacist in their intervention in determining the incidence of medication discrepancies in the EHR of an outpatient family medical clinic. Before seeing the physician, the clinical pharmacist consulted with each patient and reviewed their medication list and made corrections as necessary. During the one-year study period, a total of 327 patients were seen by the pharmacist for reconciliation, and 2,167 discrepancies were identified and resolved. Of the discrepancies found, 51.1% were determined to be clinically important by the pharmacist. This study highlights the benefits of including a clinical pharmacist in the medication reconciliation process in outpatient practices.

Sarzynski, Luz, Rios-Bedoya, & Zhou, (2014) conducted a pilot study using a 'brown bag' method to improve the medication reconciliation process. Forty-six cognitively intact elders at a university-affiliated community practice were the subjects. Half of the participants were asked to 'brown bag' (bring their medication bottles with them to the appointment), and the other half were 'non-brown baggers.' Results showed that most of the 'brown baggers' did not bring all their medications to their appointment, therefore, chart list accuracy was no better for 'brown baggers' vs. 'non-brown baggers.' The authors suggest that bringing medications may prompt providers to conduct a more thorough medication history; however, regardless of

bringing medications to office visits, structured interviewing is a more accurate way to reconcile medications than using chart lists; 'brown bag requests' should be combined with structured interviewing.

Vejar, Makic, & Kotthoff-Burrell (2014) conducted a more successful 'brown bag' quality improvement project. During a 9-month period in a primary care setting that serves a patient population from ages 51 to 102, a pre and post intervention to improve medication reconciliation was conducted. A key facet of the intervention was 'brown bagging' or having the patients bring all of their prescription and over the counter medications to every visit. Baseline data for patients who 'brown bagged' their medications before the intervention was zero percent and post-intervention was 64%.The pre-intervention medication reconciliation rate was 64%, and post-intervention rose to 96%. Educating patients and staff played a significant role in increasing reconciliation rates; the most effective tools included reminder notes posted in exam rooms for patients, monthly discussions with employees about compliance rates and automated phone reminders for patients to bring their medications to their visit.

The Institute for Healthcare Improvement (IHI) *How-to Guide: Prevent Adverse Drug Events by Implementing Medication Reconciliation* is an evidence-based protocol for implementing a medication reconciliation process at all transitions' of care, including admission, transfer, discharge and ambulatory sites. Based on Johns Hopkins Nursing Evidence Based Practice (JHNEBP) evidence rating scales (Newhouse, Dearholt, Poe, LC, & White, 2005) the strength of evidence is level 4, and quality of evidence is A. This guideline advises on how to Conduct Medication Reconciliation Reviews, complete the medication reconciliation, reconcile differences as well as dealing with barriers.

The Agency for Healthcare Research and Quality (AHRQ) *Medications at Transitions and Clinical Handoffs (MATCH) Toolkit for Medication Reconciliation* is an evidence-based toolkit based on processes developed in acute-care settings but with core processes, tools, and resources can be adapted for use in non-acute facilities. (Gleason KM, 2012). Based on JHNEBP evidence rating scales (Newhouse, Dearholt, Poe, LC, & White, 2005), the strength of evidence is level 4, and quality of evidence is A. The toolkit is a blueprint for developing a medication reconciliation process in order to gain a single, accurate list of patient medication that is referred to as, "the one source of truth" (p. 22).

Evidence-Based Practice: Verification of Chosen Option

The AHRQ *Medications at Transitions and Clinical Handoffs (MATCH) Toolkit for Medication Reconciliation* and the IHI *How-to Guide: Prevent Adverse Drug Events by Implementing Medication Reconciliation* will be used to provide a framework for developing a medication reconciliation process at a community-based outpatient psychiatric practice.

Theoretical Framework/Evidence-Based Practice Model

Lippitt's Phases of Change Theory (Mitchell, 2013), an extension of Lewin's Three-Step Change Theory, will be used as a theoretical guide for this quality improvement project (see Appendix A). Lippitt's phases of change theory is commonly used in the nursing profession and focuses on the role and responsibility of change agent than the change itself; external change agents effect a change, the change agent relationship ends and in their place is the foundation for change to move forward (Anderson, 2015). The four elements of Lippitt's Theory are assessment, planning, implementation, and evaluation, all of which parallel the steps of the nursing process (assessment, diagnosis, outcomes/planning, implementation, evaluation) and therefore, lend themselves well to this quality project. Within the four elements of Lippitt's

Theory are seven phases that guide change:

- Phase one: diagnose the problem

- Phase two: assess motivation/capacity for change

- Phase three: assess change agent's motivation and resources

- Phase four: select progressive change objective

- Phase five: chose appropriate role of the change agent

- Phase six: maintain change

- Phase seven: terminate the helping relationship (Mitchell, 2013)

As Melat-Ziegler (2005) explains, the seven phases "do not possess rigid boundaries, rather movement may flow back and forth between the phases" (p. 204). The steps in Lippitt's Theory were used as a guide in implementing this DNP project.

Lippitt's Seven Phases

In the first three phases, change agents (management, practitioners) expressed their motivation to change, after they were made aware of the reasons (need) for change. Through collaboration, the problems were identified, and the process of change was explained. In phases four through six, change objectives in the reconciliation process were selected, the nurse's (DNP student) role in the process was defined, and the change was initiated. In the seventh and final phase, after successful integration of the change, the nurse implemented strategies to maintain the changes. This final phase corresponds with Lewin's 'refreezing' stage at which point, after finding a new way of doing things is established, changes are made permanent (Mitchell, 2013) (Melat Ziegler, 2005).

Goals, Objectives and Expected Outcomes

- With the assistance of management and staff, an evidence-based medication reconciliation project was implemented by DNP student

- The goal was a 50% medication reconciliation completion rate

- The intervention took place over a 2-month period during the months of December, 2017 and January, 2018

- After analysis of results, the objective was for an evidence-based medication reconciliation process to stay in place at the practice

Project Design

Using a stepwise approach, the AHRQ *Medications at Transitions and Clinical Handoffs (MATCH) Toolkit for Medication Reconciliation* and the IHI *How-to Guide: Prevent Adverse Drug Events by Implementing Medication Reconciliation,* with a focus on ambulatory care, guided the implementation of this practice intervention. The current medication reconciliation process was inefficient, therefore, this evidence-based quality improvement project aimed to improve patient safety through its initiation.

Project Site and Population

The project site for this quality improvement project was an ambulatory care, community mental health practice in Western Massachusetts that provides outpatient psychiatric services including psychotherapy, medication management, substance abuse treatment and crisis intervention for children to senior citizens. Being a community practice, a significant portion of the clientele have state or federal sponsored (Medicaid and Medicare) insurance. The practice served a total of 932 outpatient clients and 371 family stabilization clients in the past year.

Compliance with scheduled appointments is an issue at this practice. There is a small, core group of patients who either cancel their appointment with the medication provider at the

last minute or skip (no-show) their appointments all together. Compliance with medication provider appointments was a hindrance to completing the medication reconciliation in office.

Participants

Education on the medication reconciliation process was provided to all supervisory staff and to all participants. Participants who had appointments with the medication provider during the months of October and November, 2017 were asked if they are willing to participate in a medication reconciliation quality improvement project. Upon approval, they were asked to bring medications (prescribed and OTC) and medication lists to a subsequent appointment so they may be reconciled. Those who were not available during an appointment time were contacted by phone to inquire about their participation. The end sample included twenty-five total patients. All participants were adults, over the age of 18. Due to the potential for multiple medications being prescribed and an increased risk of inaccurate medication lists, emphasis was be placed on older patients (50+) with comorbid medical conditions.

Setting facilitators and barriers

Facilitators to the implementation of this quality improvement project included the willingness of management and staff to help initiate, facilitate and participate; including, the clinic director, an advanced nurse practitioner, and three outpatient therapy supervisors. The clinic director oversaw and approved all aspects of project implementation. Three outpatient supervisors provided feedback on the current process, helped with patient selection and provided feedback. The nurse practitioner provided assistance, as needed, in recruiting patients for the intervention. Barriers to implementation included patient refusal to participate, medication noncompliance, appointment non-compliance, inability to obtain medication lists from other providers and the overall increased probability of noncompliance in the psychiatric population.

Implementation Plan/Procedures

- Approval was obtained from site clinic director

- Institutional review board (IRB) approval was obtained

- Coordinated with staff, identified team members and established roles

- Goals and objectives determined

- Timeline developed (Appendix E)

- Flow chart for medication reconciliation process created(Appendix D)

- Form created for taking medication histories (Appendix B)

- Implementation strategy developed

- Education provided to staff

- Review patient databases/records for selection

- Patient participant list created

- Patient participation requested

- Reminders sent to patients to bring medications and lists to visit

- Releases of information (ROI) updated as necessary

- Patients interviewed, medication bottles and lists reviewed

- Medication information obtained from outside as necessary (providers/pharmacies)

- Patient provided with updated and completed medication list (Appendix B)

Measurement Instruments

In order measure the outcomes of this DNP project, **pre** and **post** medication

reconciliation data was recorded to include:

Qualitative data:

- Patient gender

- Patient age

- Brought medications for reconciliation (y/n)

Quantitative data:

- Number of no-show appointment in the previous year

- Number of psychiatric medications

- Number of non-psychiatric medications

- Number of over the counter medications

- Number of potential drug interactions total

- Number of potential drug interactions between those medications that were in the
  medication profile with the number of medications that were not in the medication profile

Data Collection Procedures

The Plan-Do-Check-Act (PDCA) Cycle guided this quality project. The Plan-Do-Study-Act (PDSA) cycle, part of the IHI Model for Improvement, is a tool for accelerating quality improvement by planning it, trying it, observing the results, and acting on what is learned (AHRQ, 2013). The plan stage is recognizing an opportunity and planning a change. The do stage involves testing the change and carrying out a small-scale study. The check stage involves reviewing the test, analyzing the results and identifying what was learned. The act stage involves taking action based on what was learned and if the change did not work, going through the cycle again with a different plan. If the plan was successful, incorporating what was learned into wider changes and using what was learned to plan new improvements then beginning the cycle again (American Society for Quality, 2017).

Steps

After this DNP student had been seeing patients in the practice for over a year, it was apparent that EMR's were not up to date with the most current medications and that the practice of mediation reconciliation was either inadequate or all together, absent. It was at that time that this DNP project was conceived and brought to the attention of the clinic director.

Team selection

After assessing the needs and motivation to change, meetings were held with the clinic director, the outpatient therapy supervisors, therapists and nurse practitioner to discuss medication reconciliation as a process and to discuss the importance of keeping the EMR up to date with current medications. Separate meetings were held with the practice's compliance officer and Information Technology (IT) representative and the Manager of Integrated Services. Discussion was held with Manager of Integrated Services about potentially having a compliance report created for completion of the medication reconciliation process as well as a standardized electronic medication reconciliation form to be completed by the admitting clinician.

Discussion was held with IT officer requesting to have more providers listed in the drop down list of prescribers; as the current system is built, the only providers who can be chosen are those who work for the organization. Other providers must be listed in a free text field that is not visible unless a '+' sign is clicked. Meetings with supervisors included discussion about the process of medication reconciliation, the plans for the intervention as well as discussion about potential patients to be selected.

Intervention

The patient population at the practice ranges from children as young as four to adults as old as seventy-five. Although a large percentage of the patient population are only being prescribed psychiatric medications from the nurse practitioners in the practice, many of the older

adults have comorbid medical conditions and are on more than one medication from their

medical providers; this was the population targeted for this intervention. Thirty-five patients

were selected to have their medications reconciled as per the AHRQ and INH Guidelines.

During provider visits, the importance of maintaining updated medication lists was explained

and selected patients were asked to participate in this intervention. Additional patients were

contacted by phone. The initial plan was to have all patient's medications reconciled in the

office.

The reconciliation process began as an in-office intervention but due to appointment non-

compliance, extended to home visits. In office or in home, prescription medication bottles were

reviewed as well as over the counter medications. Medication lists in the EMR were updated

and release of information (ROI) were signed for primary care and specialty practices, as

necessary. Calls were placed to providers and pharmacies as necessary. Patients were provided

with medication lists and they were faxed to primary care practices as necessary. For reasons

including appointment non-compliance and inability to coordinate, by the end of intervention,

twenty-five patient's medication profiles were updated (71%) in the EMR.

Data Analysis

Statistical Package for the Social Sciences (SPSS) version 24 was used for data analysis

of the measurement instruments described previously.

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Cost-Benefit Analysis/Budget

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This DNP project was executed almost exclusively by this DNP student. Meetings with

staff were conducted during normal operating hours and in most cases, during the course of

already scheduled meetings.

Timeline

The timeframe for this intervention was from September, 2017 through April, 2018 (see Appendix E). University of Massachusetts Amherst institutional review board (IRB) approval was sought in September 2017, and participant selection took place in October and November, 2017. Implementation and data collection took place during the months of December, 2017 through January 2018. Data analysis and completion of the final report will took place during the months of February and March, 2018.

Ethical Considerations/Protection of Human Subjects

Although the behavioral health practice does not currently use a formal medication reconciliation process, review of medications is part of every assessment or reassessment visit to the practice. Since the collection of prescribed medication information is already part of a standard office visit, it is a service that is covered by the Health Insurance Portability and Accountability Act (HIPAA). Since this intervention will take place as a matter of routine during office visits, it too will be covered by the same HIPAA practices and will introduce no further risk of harm to patients. All current HIPAA practices at the practice will continue to be followed and patient data will be kept secure and protected. In September, 2017, it was determined by of University of Amherst, Office of Research Compliance, that this DNP project did not meet the definition of human subject research thus, IRB approval and participant consent was not required.

Results

Pre-intervention Descriptive Statistics

Sample

The final sample population for this DNP project included 25 adults, from a behavioral health practice in Western Massachusetts. The majority of whom have comorbid medical

conditions and with a mean age of 54 years (SD=5.1). The sample included 20 females (80%)

and five males (20%).

Patient Compliance

Patient compliance was evaluated using two methods. Initially, a patient was considered

compliant if they brought in their medications as instructed for the medication reconciliation.

Patient compliance was also evaluated by examining the number of times they did not show up

("no-show") for their provider visit.

Intervention compliance. Of the 25 total subjects, 12 (48%) brought their medications to

their provider visit as instructed.   Just over one-half (52%) did not bring in their medications.

This led to extending the intervention to a home visit for 13 patients so that medications were

reconciled in their homes.

Appointment compliance. The total number of no-show visits in the previous 12-months

for all 25 subjects was 39 missed appointments. Of the 13 subjects who had their medications

reconciled in the home, the mean number of "no-show" visits were 2.2 (SD = 1.1). The mean

number of "no show" visits among those who did bring in their medications was significantly

less with a mean of 0.8 (SD = 0.9, t = 3.4, p = 0.002).

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Medication Reconciliation

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As discussed in the intervention section, both prescription and over-the-counter

medication bottles were reviewed and medication lists in the electronic medical record were

updated based on this reconciliation process. Paired sample T-tests (See Table 1) were

performed to compare pre and post medication reconciliation differences between psychiatric

medications, non-psychiatric medications and over-the-counter medications. Results indicated

that there was a significant difference between pre and post over-the-counter medications

(mean=2.28) and a very significant difference between pre and post non-psychiatric medications

(mean=4.52).

Table 1. *Pre and post medication reconciliation paired sample statistics*

Medications	N	Mean	SD	t	p
Psychiatric					
Pre reconciliation	25	2.8	1.2	1.4	0.185
Post reconciliation	25	3.0	1.4		
Non-Psychiatric					
Pre reconciliation	25	0.4	0.6	8.2	<0.001***
Post reconciliation	25	4.5	2.8		
OTC					
Pre reconciliation	25	0.0	0.0	4.6	<0.001***
Post reconciliation	25	2.3	2.5		

†p ≤ .10. *p ≤ .05. **p ≤ .01. ***p ≤ .001

Drug Interactions

Post medication reconciliation analysis used ANOVA to determine statistical differences

between compliance groups (see Table 2). Results indicated that the 12 *in-office* subjects had a

mean of 3.4 non-psychiatric and *2.4 OTC* medications missing from their EMR; those 13 who

had their medications reconciled *in home* had a *mean of 5.5* non-psychiatric and *2.2 OTC*

medications missing from their EMR. There was clinical significance (p= 0.052) between the in-

office and home visit compliance group with reconciled non-psychiatric medications with a

mean of 5.5 medications among the home group and 3.4 among those that brought in their

medications with a large effect size (0.82) supporting that many non-psychiatric medications are

not accounted for in the medication profiles of patients.

Results further indicated that those who had their medications reconciled in home had a

total higher risk (mean=1.5) of potential medication interactions. Although under-powered

(would need N=62 to be a statistically significant result) the large effect size of 0.72 (based on

Cohen's d), when comparing drug interactions between those who did and did not bring their medications to office for reconciliation, indicates a result that is clinically significant.

Table 2. *Post Med Reconciliation Analysis by Compliance Group*

| Medication Type	Compliance Group	N	Mean	SD	F	p	d
Reconciled non-psychiatric medications	1 (brought)	12	**3.4**	2.8			
	2 (home)	13	**5.5**	2.4	4.192	**0.052**	**0.82**
	Total	25	4.5	2.8			
Reconciled psychiatric medications	1	12	2.7	1.4			
	2	13	3.2	1.4	1.015	0.324	0.40
	Total	25	3.0	1.4			
Reconciled OTC medications	1	12	**2.4**	3.2			
	2	13	**2.2**	1.6	0.068	0.797	0.10
	Total	25	2.3	2.5			
Potential drug interactions-total	1	12	**0.6**	0.9			
	2	13	**1.5**	1.5	3.242	0.085	**0.72**
	Total	25	1.0	1.3			
Potential drug interactions-drugs not in EMR	1	12	**0.3**	0.8			
	2	13	**0.5**	1.4	0.202	0.657	0.18
	Total	25	0.4	1.1			

Clinical Relevance

Overall, patients who did not bring their medications to the office for reconciliation had more appointment no-shows and had a higher potential for drug interactions; this sub-group was also prescribed more medications and used more OTC medications, overall. This could be a significant finding in treating a vulnerable population such as behavior health patients. Whether homebound due to medical health issues, mental health issues, substance abuse issues, inadequate finances (transportation) or other, they may be at higher risk for adverse outcomes. This highlights the potential need for home health interventions, including medication reconciliation.

Discussion

Through this intervention, a 71% medication reconciliation completion rate was achieved; more than the 50% goal that was set. Results reflected that each patient had at least one medication missing from their EMR and that overall, there were a significant number of medications missing. After medication reconciliation was completed:

- A total of 103 (mean 4.1) additional non-psychiatric medications were entered into the medication profiles; this increased the total number of psychiatric medications in the medication profile for all patients from 10 to 113 (see Table 3).

Table 3. *Pre and post medication reconciliation non-psychiatric medications*
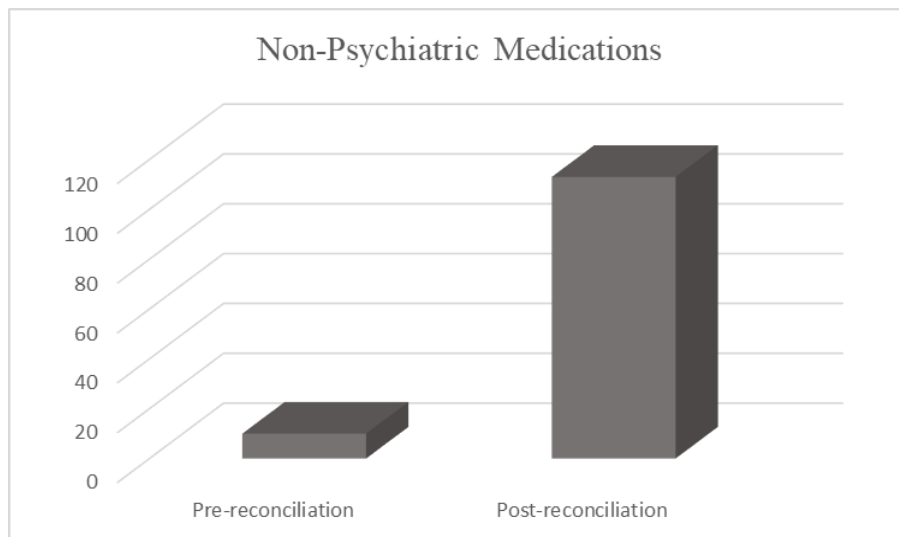
- A total of 57 (mean 2.3) over the counter medications (OTC and supplements) were entered into the medication profiles; this increased the total number of OTC medications in the medication profile for all patients from 0 to 57 (see Table 4).

Table 4. *Pre and post medication reconciliation OTC*
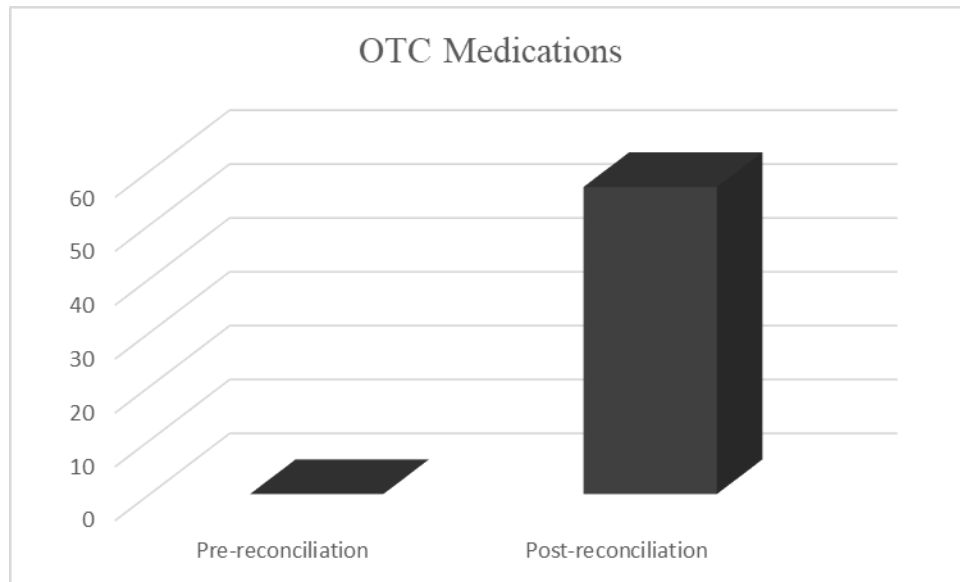
OTC Medications

- Those 12 who brought their medications to the office for reconciliation had a mean of 3.42 non-psychiatric medications and 2.42 OTC medications missing from their medication profiles.

- Those 13 who had their medications reconciled in the home with a mean of 5.54 non-psychiatric medications and 2.15 OTC medications missing from their medication profiles (see Table 5). .

Table 5. *Mean difference between in office and in home reconciliation*

Group Means
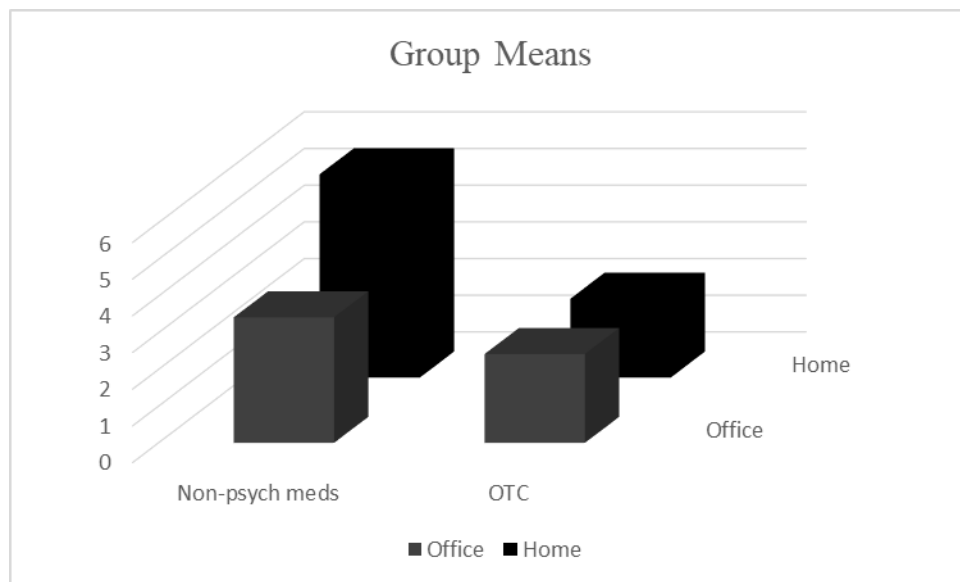
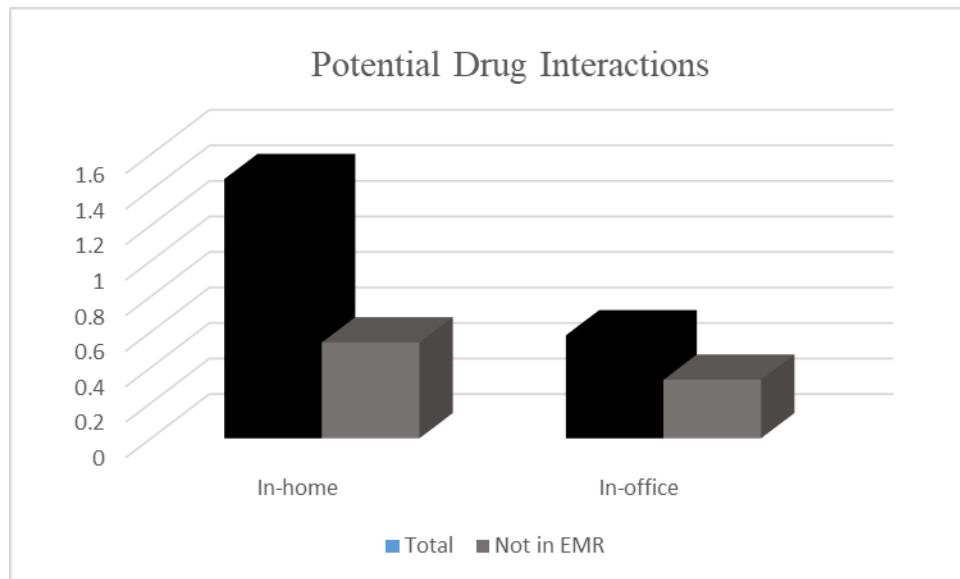**Potential Drug Interactions:**

As discussed previously, medication errors and adverse drug interactions are of particular concern in healthcare today. In light of that, it was of particular interest that through this intervention, several potential drug interactions were identified. In all, 26 potential drug interactions were identified; eleven of those were between medications already in the medication profile with those not in the medication profile.

- Those 13 who had their medications reconciled in the home had a mean of 1.46 for total potential drug interactions and a mean of 0.54 for potential drugs in the EMR with those not previously in the EMR.

- Those 12 who brought their medications to the office for reconciliation had a mean of 0.58 for total potential drug interactions and a mean of 0.33 for potential drug interactions between drugs in the EMR with those not previously in the EMR (see Table 6).

Table 6. *Potential Drug Interactions In-Home vs. In-Office*

Overall results reflected that those who were reconciled at home had more missing medications (mean 5.54 vs 3.42) in the EMR as well as a higher potential for total drug

interactions (mean 1.46 vs 0.54).   Those results highlight why patients are at such increase risk

when medication reconciliation is not performed correctly and why the World Health

Organization named it as one of five top patient safety strategies.

Suggestions and Future Recommendations

There was clearly a practice gap in this mental health practice in the area of medication

reconciliation. Not only was there a practice gap but there was also a knowledge gap amongst

the staff and one could even say, among the organization as a whole. Although reconciling

medications was a part of admitting new patients to the practice, it was not executed thoroughly

and completely to create the "one source of truth." With education, however, the staff at the

practice were found to be very receptive about improving the process; or as Lippitt describes it,

they had to motivation and capacity to change.

Conclusion

Increasing rates of chronic illness have resulted in an increase in the complexity of

medication regimens. Patients are having medications prescribed in acute care facilities, skilled

nursing facilities and in multiple outpatient settings, thereby opening up the potential for an

increased risk of adverse drug events (ADE). Adverse drug reactions represent a serious and in

many cases, preventable, public health problem that can lead to illness, disability, and death.

Medication reconciliation is a process that can help reduce the potential for adverse drug events.

When medications are reconciled accurately in an outpatient setting, a *best possible medication

history* is created.

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Appendix A

Lippitt's Phases of Change Theory

Nursing process elements	Lippitt's theory
Assessment*	*Phase 1.* Diagnose the problem
	Phase 2. Assess motivation/capacity for change
	Phase 3. Assess change agent's motivation and resources
Planning†	*Phase 4.* Select progressive change objective
	Phase 5. Choose appropriate role of the change agent
Implementation‡	*Phase 6.* Maintain change
Evaluation‡	*Phase 7.* Terminate the helping relationship

Key: * Assessment = Lewin's unfreezing stage
         † Planning/implementation = Lewin's moving stage
         ‡ Implementation/evaluation = Lewin's refreezing stage

(Lewin 1951, Lippitt *et al* 1958, Pearson *et al* 2005)

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MEDICATIONS   Appendix B   **Patient Name:**

Start Date	Name of Medication	Prescribed By	Dosage	When is the Medication Taken	Purpose	Danger Signs*	Notes/ Changes
mm/dd/yy	Brand and Generic name (If available)		mg/ units/ puffs/ drops	How many times per day? Morning and/or night? After meals?		Call Immediately if you experience any of these signs	Drugs and/or food that may cause interactions. Date list was reviewed/updated

Appendix C					
Citation	Sample/location	Design	Outcomes/results	Strengths/weakness	Evidence Level
Nassaralla, C., Naessens, J., Hunt, V., Bhagra, A., Chaudhry, R., Hansen, M., & Tulledge-Scheitel, S. (2008). Medication reconciliaiton in ambulatory care: attempts at improvement. *Quality Safety Healthcare*, 402-407. doi:10.1136/qshc.2007.024513	Sample: pre and post intervention N=325 Location: Four academic ambulatory, primary care medicine clinics	Patients were selected by using random numbers Patients received an LPN-guided 'patient awareness' intervention about the medication reconciliation process Impact of intervention assessed post-intervention	Completeness of medication lists improved from 20.4% pre-intervention to 50.4% post-intervention Patient participation in the medication reconciliation process increased from 13.9% to 33%; lastly, medication list accuracy improved from 11.5% to 29%.	Strengths: Few patients met the exclusion criteria It's possible to improve accuracy of medication lists with low a technology solution Weaknesses: No control group to compare with post-intervention group Conducted among four practice settings that may not generalize to other settings	3 B

| Citation	Sample/location	Design	Outcomes/results	Strengths/weakness	Evidence Level
Keogh, C., Kachalia, A., Fiumara, K., Goulart, D., Coblyn, J., & Desai, S. (2016). Ambulatory medication reconciliation: Using a collaborative approach to process improvement at an academic medical center. *The Joint Commision*, 186-192.	22,884 patient visits per month three months of 2013; 256,800 patient visits nine months of 2014 (1 yr. study period). Location: 148 Brigham and Women's Hospital ambulatory care practices in Boston	Pilot study and Institutional collaborative improvement project Three levels (rigorous, modified, less intensive) of interventions that centered on staff education were implemented	From pre to post-intervention, improvement from 71% to 90% in specialty practices and from 62% to 91% in primary care practices and across all ambulatory practices increased from 81% to 90%.	Strengths: Use of a collaborative model that aligned with policy, EHR tools and reliable electronic measurement Weaknesses: Pressure on provider time affected attendance in collaborative sessions Financial incentive added in final phases	3 B

Citation	Sample/location	Design	Outcomes/results	Strengths/weakness	Evidence Level
Milone, A., Philbrick, A., & Harris, I. F. (2014). Medication reconciliation by clinical pharmacists in an outpatient family medicine clinic. *Journal of the American Pharmacists Association*, 181-187. doi:10.1331/JAPhA .2014.12230	N=327 Location: Family Medicine Clinic in St. Paul, MN	Non-experimental research is the label given to a study	Pharmacist-led intervention. Before seeing the physician, the clinical pharmacist consulted with each patient and reviewed their medication list and made corrections as necessary. 2,167 discrepancies were identified and resolved; 51.1% were clinically important	Strengths: High number of patients seen, resulting in large number of discrepancies and ability to categorize them Weaknesses: Time spent on each visit not recorded Subjective nature of data points (patient knowledge status, clinical importance of discrepancy	3 B

Citation	Sample/location	Design	Outcomes/results	Strengths/weakness	Evidence Level
Sarzynski, E., Luz, C., Rios-Bedoya, C., & Zhou, S. (2014). Considerations for using the 'brown bag' strategy to reconcile medications during routine outpatient office visits. Quality in Primary Care, 177-187.	N=46; cognitively intact elders Mean age 79.8 yrs University-affiliated community geriatric clinic	Cross sectional pilot study Half of the participants were asked to 'brown bag' (bring their medication bottles with them to the appointment) The other half were 'non-brown baggers.'	61% of 'brown baggers' (BB) did not bring all their medications to their appointment 6.5% of chart medication lists were correct BBs reported having had a ***comprehensive med review*** vs. NBB which suggests the ***value of the BB strategy***	Strengths: Brown baggers had comprehensive med reviews Weaknesses: Low compliance with brown bagging Partial brown baggers not differentiated from those who brought all meds Time-consuming process	3 C

Citation	Sample/location	Design	Outcomes/results	Strengths/weakness	Evidence Level
Vejar, M., Makic, M., & Kotthoff-Burrell, E. (2014). Medication management for elderly patients in an academic primary care setting: A quality improvement project. Journal of the American Association of Nurse Practitioners, 72-78. doi:10.100212327-6924.12121	1580 chart audits 903 patient questionnaires Senior clinic within a large academic setting	Quality improvement project	Medication reconciliation compliance increased from 64% to 96% Patients who brought their medications to visit increased from 0% to 64%	Strengths: Increased awareness among providers of importance of med management in PCP setting Improved med management enabled the clinic to reach the national standards for medication reconciliation	3 B

Appendix D

Flow Chart for Medication Reconciliation Process
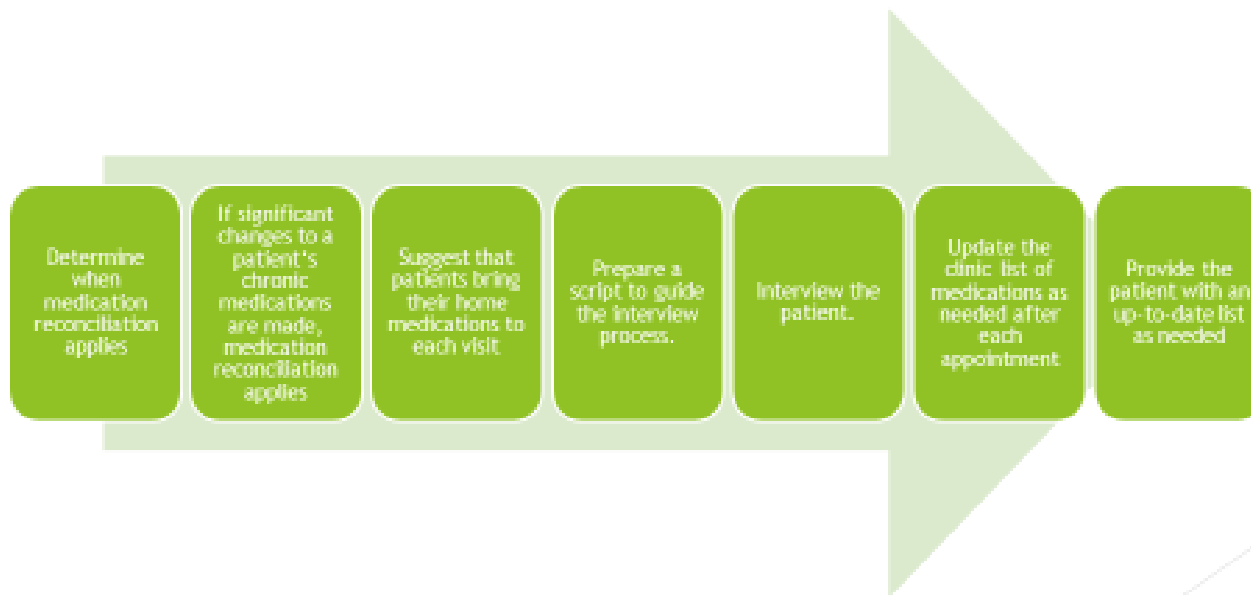
Adapted from the Institute for Healthcare Improvement, 2011

Appendix E

Timeline

Task	October	November	December	January	February	March	April
Patient selection	X	X					
Intervention			X	X			
Data analysis and final report					X	X	X