Medication Reconciliation for Patients in an Outpatient Behavioral Health Clinic

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In its report on patient safety issues in the health care arena, the Institute of Medicine (IOM) revealed that medication errors alone result in over 7,000 deaths annually and that two out of every one hundred patients experience preventable medication errors at a generalizable cost of two billion dollars per year (Kohn, Corrigan & Donaldson, 2000). Ten years later, the Institute for Healthcare Improvement (2010) reported the estimated cost of avertible inpatient medication errors to be 16.4 billion dollars a year, and in ambulatory care, 4.2 billion dollars. Development of a culture of quality and safety is required to decrease preventable harm and cost with regard to medication errors (Andel, Davidow, Hollander, & Moreno, 2012).

One of The Joint Commission's National Patient Safety Goals (2015) for behavioral health care is to improve patient safety by using medications safely, which can be accomplished by routinely comparing and updating medication regimes for an individual. Every patient in the healthcare setting, regardless of environment, should have access to a transferable integrated medication record that is easily accessed, updated, and upholds safety principles (Greenwald et al., 2010). While most research is focused on the high cost of hospital medication errors, the *Medications at Transitions and Clinical Handoffs (MATCH)* toolkit for medication reconciliation, supported by the Agency for Healthcare Research and Quality, allows for adaption of tools and forms for use in any healthcare setting (Gleason, Brake, Agramone, & Perfetti, 2012).

Medication reconciliation (MR) is a process of standardized assessments and customized tools to identify discrepancies in a patient's medication regime (Gleason et al., 2012). MR assesses if the correct medications are being administered at the correct dose, route, frequency,

purpose and if there are unintended untoward effects for each medication prescribed (Atlantic Quality Innovation, n.d.). This comparison becomes very complex when a patient is treated by several health care practitioners, is cared for in various health care settings, or has experienced a change in health status requiring multiple medication changes.

The need for MR has been identified as a potential patient safety issue by the primary care and psychiatric mental health practitioners in an outpatient behavioral health clinic in Anne Arundel County, Maryland. This clinic serves approximately 3,000 adults and children. There are 120 chronically mentally ill patients with compromising physical conditions enrolled in a designated medical home program within the clinic. This program provides residential housing, as well as, access to primary care and psychiatric mental health clinic services. The physical dependency and high acuity of medical and psychiatric comorbidities in this patient population necessitates enhanced opportunities for continuity of care and professional collaboration. Many other patients come to the clinic for intensive out-patient programs, supervised groups, and activities. Other patients, at varying levels of functionality, are seen directly from the community.

Primary care access in the clinic is limited to two days a week, and has only been offered during the past two years. Behavioral health services are available five days a week and are located on a different floor from the clinic's primary care services. The geographic location could be a barrier to collaboration because the providers do not have opportunity to physically interact. Primary care services are provided to the patients of highest acuity in residential housing; and this could decrease opportunities for provider collaboration.

Another more critical barrier for the two specialties is the current use of non-compatible electronic health records (EHRs). Clinic prescribers also describe a lack of standardized

processes, protocols, and procedures for MR. The practice problem is the identified gap in medication reconciliation between the two nurse practitioner specialties and the use of three modes of comparing EMR accuracy. The three separate modes of comparing accuracy are comprised of the use of two separate forms and, for higher functioning community patients, by verbal report.

Evidence-based interventions are required to enhance patient medication safety. The purpose of this quality improvement project is to assess the current frequency of medication discrepancies and correct medication discrepancies when observed in patients' medication regimes by utilizing an MR audit tool employing a feedback mechanism. This process will alert prescribers of potential medication errors at each clinical encounter. The expected outcome will be: an initial needs assessment, improved patient safety secondary to enhanced prescriber awareness; prevention of untoward medication effects; and reduced numbers of discrepancies in patient medication regimes.

Theoretical Framework

Clinical practice can be changed through quality improvement projects that demonstrate evidence-based or best practices within the clinical setting. Translation, implementation, and evaluation of evidence-based or clinically effective practice interventions for quality improvement can increase patient safety and decrease health care costs. It is critical that ongoing discrepancies between effective research interventions and actual intervention delivery in clinical practice are addressed.

Rycroft-Malone's (2004) *Promoting Action on Research Implementation in Health Services (PARIHS)* framework guides the implementation of evidence-based practice in the clinical setting. This framework examines three essential areas: *evidence, context, and*

facilitation. These areas are assessed and rated on a continuum, of low to high, regarding their likelihood for facilitating or blocking successful implementation of clinical interventions. PARIHS framework creates an environment to discern success or failure in behavioral change (Ullrich, Sahay, & Stetler, 2013). This quality improvement project uses *evidence* collected from sixty-six audits, assessing medication discrepancies that compare EHR prescribed medications to the accepted individualized medication form used at the clinic. The *context* is the specialty environment and the provider treatment systems. *Facilitation* of the project relies on the roles, strategies, commitment, and buy-in from the organization and patients in order to promote positive change in harm reduction for patients seen by both specialties.

Literature Review

Growing awareness, related to the high personal and financial costs of medication errors, motivated research and expert collaboration to seek solutions (Gleason et al., 2010); Kohn, Corrigan, & Donaldson ,2000). *The National Patient Safety Goal*, endorsed by the Joint Commission, identifies medication reconciliation (MR) across all health care settings as a plausible solution to the complex issue of medication errors (Greenwald et al. 2010; Lee et al. 2014; Neufeld et al. 2013; The Joint Commission, 2013). Much of the research refers to hospital admissions, transitions and discharges which are where the highest incidence of medication error occurs. Outpatient research is scant and research concentrating on behavioral health populations is often only recommended for future studies.

A literature review was conducted; nine studies were chosen to support the proposed MR project. An evaluation and rating of the literature can be found in Appendix A. Consensus of the evidence supported patients' personal possession of an accurate medication list, and providers review of the list as initial interventions in development of MR. Providers' use of an audit tool

employing a feedback mechanism was shown to enhance behavioral changes in the practice of prescribers consistently reviewing medication lists (Ivers et al., 2012).

Patient safety is paramount in creating an efficient and cost effective health care system, however, adverse drug effects (ADE) and medication errors are linked to loss of life, functional impairment, loss of income, inability to provide for family, legal ramifications, etc. (Andel et al., 2012). Lee et al.(2014) posited that ADEs can span the risk from minor harm to iatrogenic morbidity among patients. Between 2005 and 2007, 13.5 million ADEs were reported in 72 percent of all outpatient settings and in 28 percent of emergency departments (Sarker et al., 2011). Thus, ADEs are a major cause of concern for every health care provider.

Medication errors decreased from 89 percent to 66 percent when patients were involved in programs that engaged patients in presenting their medication lists or bottles to their practitioners (Varkey, Cunningham & Bisping, 2007). Half of the individual patient medication discrepancies or errors were eliminated in an outpatient study by Varkey et al.(2007). It is projected that 60 percent of medication errors, or untoward effects, following a hospital discharge, can be prevented by focusing on any medication discrepancies that occur between providers and patient through a thorough review of current medications during every healthcare visit (Halasymani et al., 2006; Stratis Health, 2014).

Medication errors were identified 85 percent of the time during patient admission medication histories, nearly half of these were related to medication omissions (Gleason et al., 2010; Nanji et al., 2011). Prescriber order errors were assessed in 35.9 percent of the cases (Gleason et al., 2010). Multiple causative factors for ADEs and errors, such as polypharmacy and ineffective medication teaching, were elicited in the literature.

Polypharmacy is reported as a barrier to accuracy in older and compromised patients' ability to communicate their medication regimes and this situation escalates potential drug-drug interactions (Gleason et al., 2010; NCHS, 2010; Sarkar et al., 2011). Patients may be poor historians or may omit information from their medication list (Baker et al., 2002; Gleason et al., 2010; Nanji et al., 2011). Omissions and unclear instructions, such as "take as directed," can lead to potential errors in drug administration (Nanji et al., 2011). Consistent provider review of individual medication lists could identify omissions and decrease medication discrepancies and errors.

Several experts report ineffective medication teaching and counseling from prescribers and pharmacists as contributing factors in errors (Richard & Lussier, 2006; Sarker et al., 2011; Tarn et al., 2006). Implementation of patient medication lists and provider audits employing a feedback mechanism will increase awareness and education opportunities (Ivers et al., 2012).

Healthcare transitions and clinical handoffs are identified as critical times for errors to occur (Gleason et al., 2010; Lee et al., 2014). On hospital admissions as many as 67 percent of encounters experienced at least one difference in patients documented medication list (Tam et. al, 2005). Following discharge, medication mismanagement is a noteworthy cause for readmission (Stratis Health, 2014). Incomplete or poor communication between medical providers is also cited as causing over fifty percent of medication errors, during transitions of care (Barnsteiner, 2005; Gleason et al., 2012; Greenwald et al., 2010; Lee et al., 2014; Tache et al., 2011). Many of these pitfalls in communication and transition can be remediated with systematic processes in place.

The medication remediation toolkit to be utilized for initial project implementation was sustained by the Agency for Healthcare Research and Quality (AHRQ) with collaboration

between Northwestern Memorial Hospital, Northwestern University Feinberg School of Medicine and The Joint Commission. *The Medications at Transitions and Clinical Handoffs (MATCH) Toolkit* (Gleason et al., 2012) is applicable for inpatient and outpatient practices. It offers step by step instructions in defining the problems, developing MR protocol, implementing a process, assessing outcomes, evaluating results and involving the patient and family. The prepared resources are available to adapt to various health care settings.

In settings where electronic MR is not feasible, best practices outlined in the MATCH toolkit (Gleason et al., 2012) are to rely on paper reconciliation lists (forms) that includes the involvement and education of the patients and their advocates about their individual medication purpose, dose, frequency and duration schedule. Patients require education on the importance of an updated list kept in their wallet and presented at every health care visit (Gleason et al., 2012; Greenwald et al., 2010; Lee et al., 2014). Patients and their families or advocates are perceived as key stakeholders in maintaining accurate medication lists (Greenwald et al., 2010).

Clinician compliance in MR is enhanced by 4.3 percent when audits, employing a feedback mechanism, are utilized (Ivers et al., 2012). When this intervention is facilitated in the correct context it has demonstrated improved practice behavior (Hutchinson et al., 2015; Ivers et al., 2012; Jamtvedt et al., 2006; Sales et al., 2010). The main objectives in this reporting strategy are to audit data for discrepancies and to alert the practitioners of potential error. This process may also identify barriers to reporting errors in the organization. Audits provide evidence of quality professional practices.

These audits and the resulting data strengthen the focus of this project on the healthcare provider's routine practices that include: reviewing medication documentation; and reviewing individualized pharmacotherapy with each patient. This practice would result in other

practitioners being aware of medication changes for individual patients. It would enhance communication, prevent omissions, evaluate polypharmacy, and provide educational opportunities. Involvement of both patients and health care practitioners in the initial implementation of MR will activate a standardized process of medication remediation at a clinic focused on improved patient safety.

Methods

This quality improvement project utilized three different ways to compare the prescribers' electronic medical record for prescribed medication accuracy. One form called "Avenues" is generated by clinic staff, using the medication lists patients were administered in the patients supervised residence. A second form called "MMR" was generated by the one pharmacy exclusively used by patients in the medical home model of care and patients in the intensive outpatient program (IOP). Higher functioning patients from the community used the third identified method; self-report which then was compared to the prescribers' electronic health record for accuracy. Prescribers then answered a total of eight questions on an audit tool: six, yes/no questions; one question, asking for the total number of medications the patient was taking; and one question, asking how many of the total number of medications required reconciliation.

The setting of the project is a not-for-profit, out-patient behavioral health clinic in Anne Arundel County, Maryland. This site serves 3,000 individuals and their families to improve behavioral health utilizing recovery oriented services. The sample populations consist of the behavioral health and primary care practitioners that directly treat or care for patients in the clinic.

Procedures and Data Collection

Project implementation involved collaboration and education on the importance of medication reconciliation and its relevance to the nurse practitioners practice in this clinic. These four prescribers were comprised of three psychiatric nurse practitioners and one primary care nurse practitioner. The group agreed to use the currently accepted medication form for individual patients and to compare those forms to their individual EHR. They agreed to fill out an audit tool for at least five patients a week. Four nurse practitioners, completing five audits a week for six weeks, would result in a total of one hundred and twenty completed audits in the six week study.

The audit tool was reviewed and feedback was given to the prescribers. Feedback and operational communication was delivered electronically in both individual and in group emails. Aggregate data was to be given to behavioral health and primary care services to improve MR for patients seen by both specialties.

The facilitator provided the latest evidence regarding the importance of these patient safety interventions. Following a treatment session with a patient, providers updated the electronic record with new information. They assessed forms and EHR for accuracy, corrected discrepancies and avoided potential ADEs.

The facilitator collected the audit tools from a central site in the primary care suites, while some practitioners chose to fax the audit forms directly to the facilitator. Summary data was discussed with the providers in week three of the project. Weekly ongoing communication via email was maintained to secure participation and continuity of the medication reconciliation procedures. Results were given at the convenience of the participants. Barriers to audit

completion, concerns, and comments from both behavior health and primary care were shared. The providers' perceptions, suggestions, and considerations were explored weekly.

Data Analyses

Data analyses for project evaluation included descriptive statistics and frequency distributions. Rates of provider compliance using documented medication reconciliation procedures were calculated as percentage of providers that completed five or more audits per week. Concordance between the clinic form of individual medication regime accuracy and providers' medication regime in the electronic records, was calculated with frequencies for those whose records match versus those with discrepancies.

Human Subject Protections

This quality improvement proposal was submitted to the Institutional Review Board at the University of Maryland Baltimore, and was deemed not human subjects research. The project facilitator did not have access to patient charts, electronic records, nor did the facilitator interact with patients in any capacity. The facilitator collected data from the providers' audit check lists, and had only indirect knowledge of the existence of the patients' personal medication lists. No patient identifiers were collected, and aggregate outcome data was not generalizable to other settings or to other patient populations. Patients interfaced directly with clinic staff that provided evidence-based medication reconciliation as a part of routine care with a focus on patient safety. Weekly summary data was provided to the staff in order to improve providers' adoption of new behaviors and to increase medication safety for patients. The facilitator did not inadvertently witness patient records nor did the facilitator overhear conversations about patients. There was strict adherence to Health Insurance Portability and Accountability Act (HIPAA) guidelines according to national standards and the professional code of ethics.

Results

The nurse practitioners in this project completed a customized audit form of eight questions. This process measure resulted in a total of 66 completed audits. The target number of audits for each of the four NPs was 5 a week for 6 weeks (30 each) for a total of 120 completed audits. The three psychiatric mental health nurse practitioners completed: 3 (10%); 15 (50%); and 25 (83%) of their targeted number of audits. The primary care nurse practitioner completed 23 (76.7%) of her targeted number of audits. Overall, the percent of audit completion was 66 (55%) of the expected completion of audits. The sample data table exhibits the findings for each audit question for each of the two forms used by the nurse practitioners.

Table 1

Summary of findings (all data based on valid responses)

Variable	Overall (n = 66) N (%)	Form 1 (n = 43) N (%)	Form 2 (n = 23) N (%)	Statistic X^2	p-Value
Q1. Reconciliation Done				[a]	[a]
Yes	66 (100.0)	43 (100.0)	23 (100.0)		
Q2. Reconciliation Accurate				1.5	0.225[b]
Yes	34 (51.5)	25 (58.1)	9 (39.1)		
No	32 (48.5)	18 (41.9)	14 (60.9)		
Q5. Medication List Provided/Discussed at Discharge				8.7	0.013[c]
Yes	53 (80.3)	30 (69.8)	23 (100.0)		
No	11 (16.7)	11 (25.6)	0		
N/A	2 (3.0)	2 (4.7)	0		
Q6. Documentation Complete				1.7	0.431[c]
Yes	63 (95.5)	40 (93.0)	23 (100.0)		
No	2 (3.0)	2 (4.7)	0		
N/A	1 (1.5)	1 (2.3)	0		
Q7. Somatic and Specialty Medications Assessed - *missing*	*26*			8.8	0.003[b,c]
Yes	33 (82.5)	10 (58.8)	23 (100.0)		
No	7 (17.5)	7 (41.2)	0		

	Overall (*n* = 66)	Form 1 (*n* = 43)	Form 2 (*n* = 23)	Statistic	*p*-Value
Grouped Number of Discrepancies				1.5	0.470[c]
0	26 (39.4)	19 (44.2)	7 (30.4)		
1	13 (19.7)	7 (16.3)	6 (26.1)		
2 or more	27 (40.9)	17 (39.5)	10 (43.5)		
	Mean (SD)	Mean (SD) Median	Mean (SD) Median	*Mann-Whitney U*	
Q3. Total Number of Medications – *missing*	*5*			-6.4	< 0.001
	10.84 (8.1)	5.58 (3.2) 5.00	19.52 (6.0) 19.00		
Q4. Number of Discrepancies	1.91 (2.6)	1.33 (1.7) 1.00	3.0 (3.7) 1.00	-1.7	0.088

[a] No statistics computed because variable is a constant.
[b] Continuity Correction – computed for a 2x2 table.
[c] Fisher's Exact estimate used because expected cell count less than 5.

The audits were in 100% compliance in comparing one of the two accepted medication forms with the practitioners EHR. Forty three of the audits used Form 1 (Avenues) used by the psychiatric nurse practitioners and twenty three of the audits used Form 2 (MMR) used by the primary care nurse practitioner. The total sixty six completed audits were represented. There were no audits completed using patients self-report compared to the EHR as discussed in initial audit completion.

Accuracy of comparative findings were found in thirty four of the sixty six audits (51.5%) completed. Form 1, revealed accuracy in twenty five of the total forty three audits (58.1%) completed. Form 2, revealed accuracy in nine of the twenty three total audits (39.1%) completed. No significant relationship was found between the two groups on the accuracy found between the forms ($\times^2 = 1.5$, p =.22).

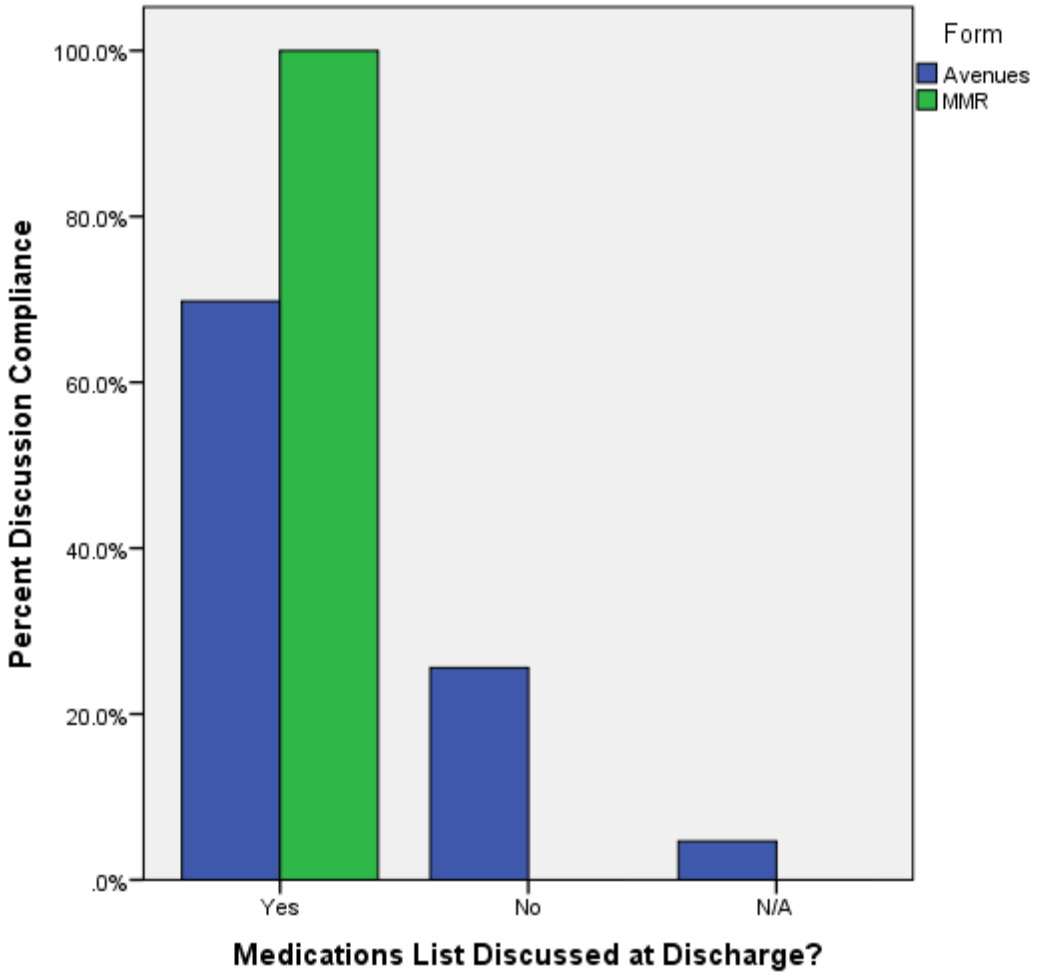

Figure 1. This figure illustrates, by form, the percent compliance with discussion of medications at time of patient discharge.

The majority of charts (80.3%) noted patients and providers discussed medication updates at the end of session. There was 100% compliance with this question on form 2. In the documentation for form 1, the outcome differed ($\times^2 = 8.7$, p =.01). Discrepancies were found in nearly two thirds (60.6%) of the patient records evaluated.

Documentation of the medication reconciliation was completed for 95.5% of the audits. Form 1 had forty (93%) completed audits. Two audits (4.7%) using form 1, did not complete

documentation and one (2.3%) audit documented response was *does not apply*. Form 2 documented twenty three (100%) of documentation was completed. ($\times^2 = 1.7$, p =.43).

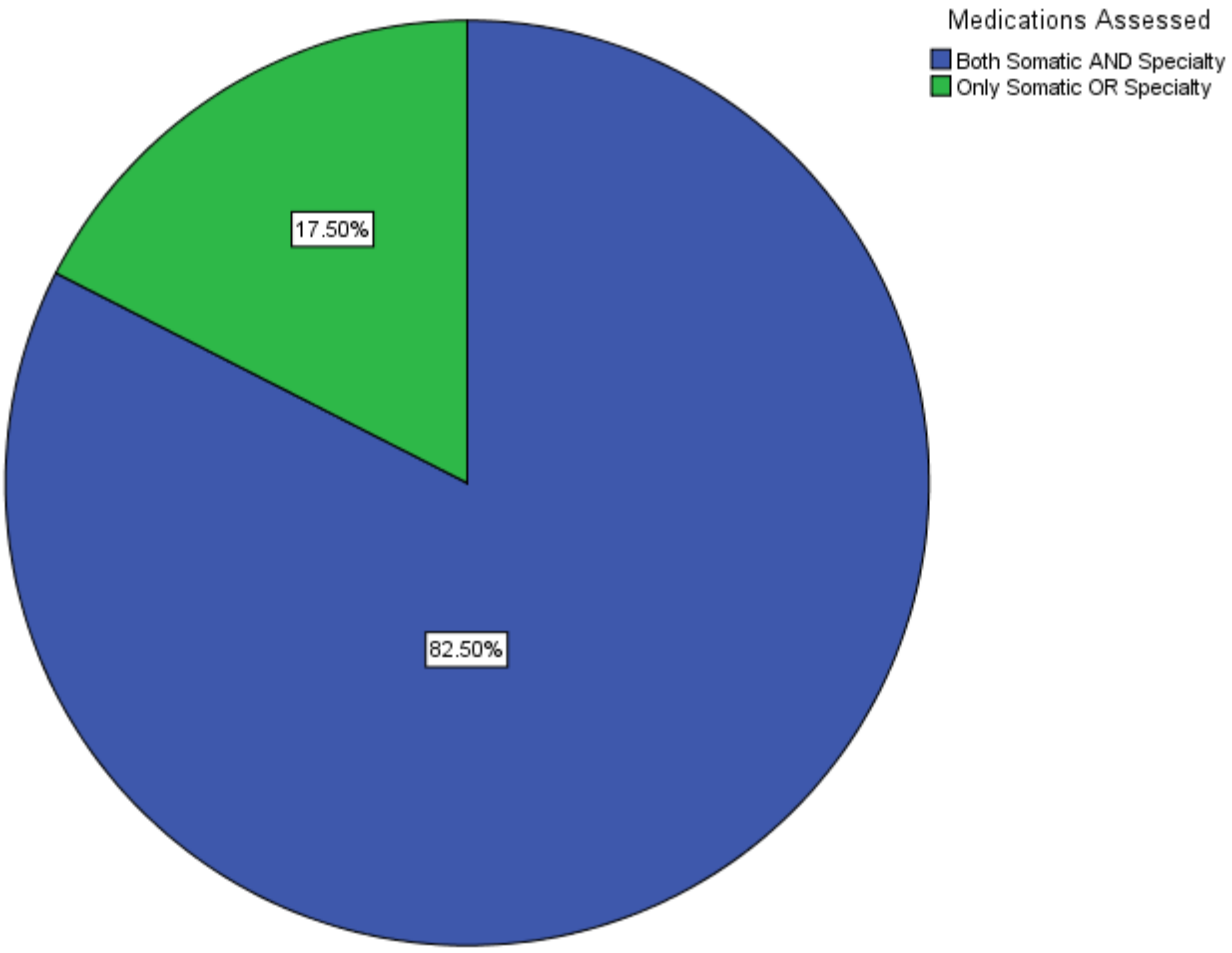

Figure 2. This figure illustrates whether medications being assessed were somatic only, specialty only, or both.

Question seven, asking if somatic and specialty medications make up the total medications received by the patient was added to the audit in week three. This was in response to a perceived potential difference in definition. One participant defined total medications prescribed by the participant, rather than all somatic and specialty medications taken by the patient. Of the total overall audits 33 (82.5%) were using all medications taken by the patient and

7 (17.5%) documented only specialty medications were being assessed. Form 1 participants documented total medications in 10 (58.8%) audits and 7 (17.5%) only specialty medications. Form 2 documented all medications 23(100%) in assessment. ($\times^2 = 8.8$, p =.00)

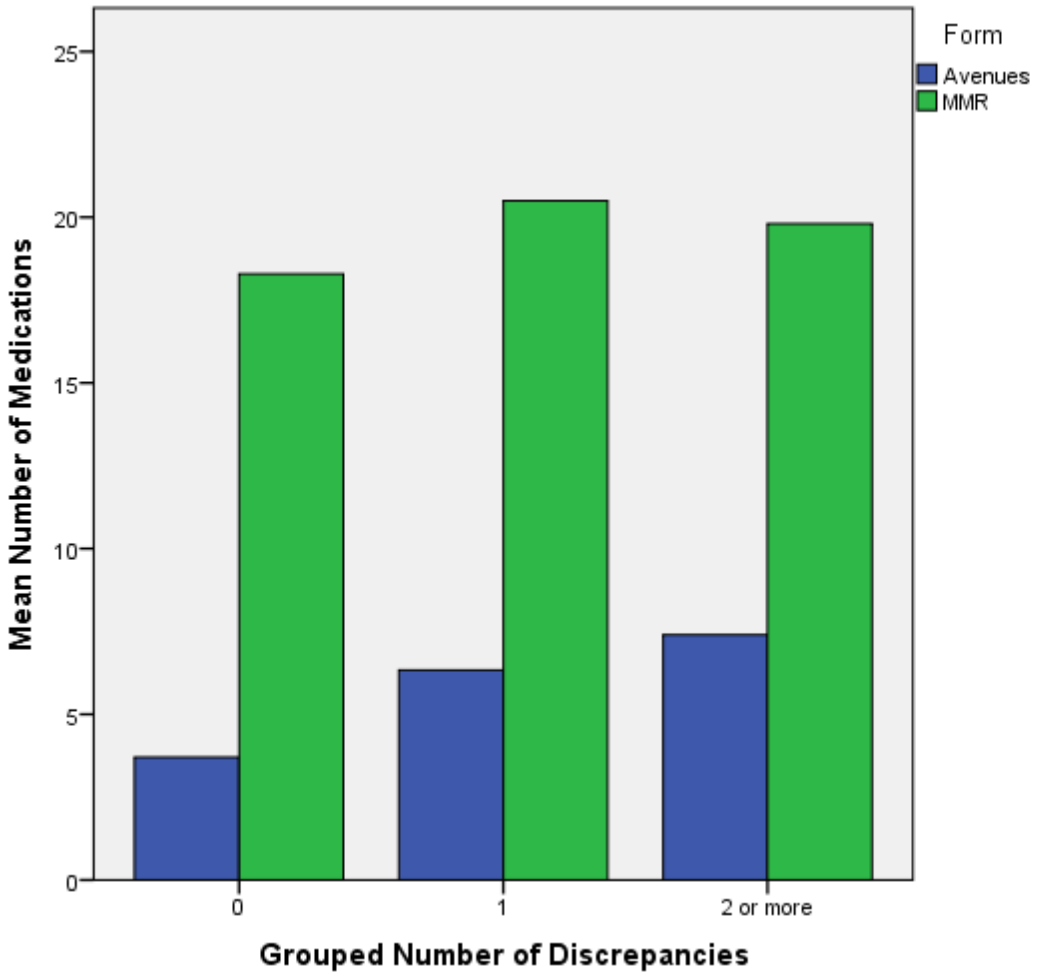

Figure 3. This figure illustrates mean number of medications assessed, by form and grouped by number of discrepancies.

On average, patients were prescribed 10.8 medications (SD = 8.1, range 1-37). The audit revealed no discrepancies for 26 (39.4%) of the charts. There was one discrepancy in 7 (16.3%) of Form 1 audits and 6 (26.1%) of the Form 2 audits. There were 2 or more discrepancies found

in 17 (39.5%) of the Form 1 audits and 10 (43.5%) of Form 2 audits. There were no differences in the number of discrepancies noted between the two forms (Mann Whitney U= -1.7, p =.09).

Discussion

Overall only 66 (55%) of the targeted 120 audits were completed. Failure to reach the targeted number of completed audits was influenced by a number of factors. One factor was two nurse practitioners took vacations within the six weeks of data collection. On week five, the clinic was quarantined, secondary to excessive numbers of patients and staffs with the flu, and no audits were received. On week six, the staff reported being overwhelmed with work overflow, secondary to the illnesses from the previous week and no audits were received.

Other possible factors for failing to reach the targeted number of audits may include: fear of being individually blamed, for negative outcomes verified in the audit collection or a lack of priority, or commitment, to the project. The practice environment is very fast paced. Many practitioners have high productivity ratings to maintain. This project may have been introduced at an inconvenient time or it may have had other competing issues, requiring the nurse practitioners attention. The IOM report readily acknowledges the fact that “to error is human” (Kohn, Corrigan & Donaldson, 2000). In current, complex health care arenas this fact is acknowledged by law suits and increased practice scrutiny.

Errors reporting, within the practitioners’ own practice setting, may heighten a negative, individual blaming environment. Providers may fear retaliation and lessoning of professional reputation. They may perceive personal knowledge deficits in improving or correcting this realm of practice. The literature discusses the need for moving from a focus on errors to the development of a culture focused on patient safety by creating extensive systems change

(Barnsteiner, 2011; Finkelman & Kenner, 2009; Kohn, Corrigan & Donaldson, 2000). This paradigm shift, from individual blame to a patient centered focus on safety requires educating all health care practitioners on the complex and unintended negative consequences built into the healthcare system (Barnsteiner, 2011).

In this one, multifarious environment alone, we have primary care and psychiatric mental health nurse practitioners using two non-compatible EHR's and using two separate medication regime forms. They are also operating without any systematic evaluation processes or procedures. There was no formal discussion, or expectation related to practice protocols. The primary care services are under the auspices of the local hospital center, whereas the psychiatric services are under the medical director of the clinic. These two entities may likely assume differing practice policies as well.

When assessing the quality of care in this project, a Donabedian framework would be an effective model to use in discerning the relationship between process and outcome. Donebedian reports (1988) that the performance of the healthcare provider has to be viewed within: the context of the healthcare system; the clinic environment; the patient population; the processes of care; and the overall outcomes of care. Having systematic processes and procedures could positively effect outcome in this environment.

Statistical findings were concerning related to the definition of total medications. The definition intended was to assess all of one patient's total somatic and psychiatric medications. One participant defined this as the total medications personally prescribed by the provider. Disparate records in an audit result in disparate results. With this discovery, and following an attempted clarifying conversation, the facilitator enacted a plan-do-study-act (PDSA) to capture

discrepancies in the project outcomes. According to Taylor et al. (2013) the PDSA is a quality improvement method frequently utilized in healthcare quality processes.

In week three of the study, a new audit was developed and initiated which added two new questions number seven and eight. Question seven asked: if total medications for patient (somatic and specialty medications were assessed) Yes/No. Question eight: asked if total medications assessed were for prescriber's specialty only, Yes/No. In some incidences, this participant then answered affirmative for both answers. Clarification of the definition was not made until late in the data collection, and consisted of 21 (adding responses to both questions 7 and 8) of the total 66 completed audits. Therefore, 32 or roughly a third of the audits were ill defined.

Another puzzling result was the, *does not apply*; response to medication review with the patient was documented by another participant. No accountability to include the patient in discussion of medication discrepancy or change would require further investigation with the provider as these are usual and customary expectations between practitioners and patients.

The range of medications documented in this project (SD=8.1, range 1-37) describe a high risk for error. Polypharmacy results in a higher risk for error. Chronically ill patients in this clinic have multiple comorbidities, and are seen regularly by primary care and psychiatric services as well as other off site specialists. Therefore, they have higher risk for drug-drug interactions, requiring systematic expert medication management.

The limitations of this project include a small sample size and short implementation span. The participants, wavering commitment, to the six-week duration of the project was observed. Two participants had differing interpretations of the audit questions. Lack of administrative

participation or expectation is another consideration requiring review. System limitations include: incompatible software systems; use of different forms; and no standardized evaluation processes in the clinic.

The audits conducted for this quality improvement project found discrepancies in the medication regimes of 60.6 % of the patient records evaluated. Therefore, a standardized process of protocols and procedures for medication reconciliation is critical for patient safety needs in this outpatient clinic. The findings, for this project, performed in a high acuity, outpatient clinic, are concordant with published research findings on medication reconciliation in other inpatient and outpatient milieus. This project supports the need for continued practitioner awareness and the implementation of evidence-based strategies required to avoid potentially dire consequences for the patients served in this clinic.

Implications

Medication reconciliation is a patient safety initiative that is vital to the development of cost effective, efficient patient care. The time required to reconcile medications has the ability prevent untoward effects including disability and death. Therefore, this process is of great clinical significance for every patient and prescriber.

Medical Home models of care, supported by the affordable care act, endorse patient centered practices that increase quality and safety for the patients served. This model of team based care is built on a common goals and open communication. This clinic and the providers involved are models of excellence for future practice sites. Professional collaboration, continuity in practice goals and standards, as well as compatible electronic resources would enhance communication and treatment transparency for patients seen by both primary care and behavioral

health services. A commitment to improve these three areas would eliminate several system barriers in medication reconciliation.

Utilization of evidence based practice interventions to increase patient safety secondary to medication reconciliation would be ideal. The MATCH toolkit offers a wealth of information for follow up and increased communication for inter and intra-disciplinary endeavors. Resources are easily accessed with a step by step process of implementation. Consultation and lessons learned by other practitioners are also available. The results, recommendations, and resources from this process improvement project will be shared with all of the nurse practitioners and administrators involved at the clinic.

Lessons learned will also be added to the curriculum of the doctoral nursing specialty for current and future students to increase future awareness.

References

Andel, C., Davidow, S., Hollander, M., & Moreno, D.A. (2012). The economics of health care quality and medical errors. *Journal of Health Care Finance 39(1).* Wolters Kluwer Law & Business.

Atlantic Quality Innovation Network/IPRO, the Medicare Quality Innovation Network Quality Improvement Organization for New York State, South Carolina and the District of Columbia under Contract with the Centers of Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. (2014). Med Rec Admission-Version 1.0. Retrieved from http://qio.ipro.org/wpcontent/uploads/2015/09/MedRec_%20audit_tool_discharge_cycle2.pdf

Baker, D.W., Gazmararian, J.A., Williams, M.V. Scott, T., Parker, R.M., Green, D., Ren, J., & Peel, J. (2002). Functional health literacy and the risk of hospital admissions among Medicare managed care enrollees. *American Journal of Public Health* 92, 1278-1283.

Barnsteiner J.H., (2005). Medication reconciliation; Transfer of medication information across settings-keeping it free from error. *American Journal of Nursing* 105, 31-36.

Barnsteiner, J. H., (2011). Teaching the culture of safety. *Online Journal of Issues in Nursing* 16 (3). doi:10.3912/OJIN.Vol16No03Man05.

Donabedian, A., (1988). The quality of care; How can it be assessed? *Journal of the American Medical Association.* 260 (12), 1743-1748,doi:10.1001/jama.1988.03410120089033.

Finkelman, A., & Kenner, C., (2009). *Teaching IOM: Implications of the institute of medicine reports for nursing* (2nd Ed.). Silver Springs, MD: Nursebooks.org.

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 handoff (MATCH) study: An analysis of medication reconciliation errors and risk factors at hospital admission. *Journal of* ***General*** *Internal Medicine*. May; 25(5): 441-7. doi: 10.1007/s11606-010-1256-6.

Gleason, K. M., Brake H., Agramone V., & Perfetti, C., (2012). Medications at transitions and clinical handoffs (MATCH) toolkit for medication reconciliation. (Prepared by the Island Peer Review Organization, Inc., under Contract NO HHSSA2902009000 13C.) AHRQ Publication No. 11(12)-0059. Rockville, MD: Agency for Healthcare Research and Quality. Revised August 2012.

Greenwald, J. L., Halasyamani, L., Greene, J., LaCivita, C., Stucky, E., Benjamin, B., Reid, W., Griffin, F. A., Vaida, A. J., & Williams, M. V. (2010). Making inpatient medication reconciliation patient centered, clinically relevant and implementable: A consensus statement on key principles and necessary first steps. *Journal of Hospital Medicine 5*(8), 477-485. doi: 10.1002/jhm.849

Halasyamani, L., Kripalani, S., Coleman, E., Schnipper, J., van Walraven, C., Nagamine, J., Torcson, P., Bookwalter T., Budnitz, T., Manning, D. (2006) Transition of care for hospitalized elderly patients-Development of a discharge checklist for hospitalist. *Journal of Hospital Medicine* 1(6), 354-360. doi: 10.1002/jhm.129

Hutchinson, A. M., Sales, A. E., Brotto, V., & Bucknall, T.K. (2015). Implementation of an audit with feedback knowledge translation intervention to promote medication error reporting in health are: A protocol. *Implementation Science.* Online: May 2015. doi 10.1186/s13012-015-0260-y

Institute for Healthcare Improvement, convened by the National Quality Forum, Washington DC. (2010). *Compact action brief: A roadmap for increasing value in health care. Preventing medication errors: A $21 billion opportunity.* Retrieved from file:///C:/Users/cburd001/Downloads/NPPBetterCareSubcommitteeMaterials_may25thmeeting_final_PUBLIC%20(2).pdf

Ivers, N., Jamtvedt, G., Flottorp, S., Young J.M., Odgaard-Jenson, J., French S.D., O'Brien M.S., Johansen M., Grimshaw, J., & Oxman, A.D. (2012) Audit and feedback: Effects on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews* Issue 6. Art. No.: CD000259. doi 10.1002/14651858.CD000259.pub3.

Jamtvedt, G., Young, J.M., Kristofferson, D.T., Obrien, M.A., & Oxman, A.D. (2006). Audit and feedback: Effects on professional practice and health care outcomes. *Cochrane Database System Review*. CD000259.

Kohn, L.T., Corrigan, J., & Donaldson, M.S. (2000). Institute of Medicine Report: *To err is human: Building a safer health system.* Washington, DC: The National Academy Press.

Lee, K. P., Hartridge, C., Corbett, K.,Vittinghoff, E., Auerbach, A.D.(2015). Whose job is it really? Physicians, nurses, and pharmacists persprctives on completing inpatient medication reconciliation. *Journal of Hospital Medicine* 10(3), 184-6. doi: 10.1002/jhm.2289

Nanji, K.C., Rothchild, J.M., Salzberg, C., Keohane, C.A., Zigmont K., Devita, J. et al (2011) *Journal of American Med Inform Assoc.* 18(6), 767-773. doi: 10.1136/amiajnl-2011-000205

National Center for Health Statistics (NCHS). (2010). *Health, United States, 2009: With special feature on medical technology.* Hyattsville, MD: National Center for Health Statistics.

Neufeld, N.J., Fernandez, M.G., Christo, P.J., & Williams, K.A. (2013). Positive recognition program increases compliance with medication reconciliation by resident physicians in an outpatient clinic. *American Journal of Medical Quality* 28(1) 40-45. doi 10.1177/1062860612443550

Richard, C., & Lussier, M.T., (2006). Nature and frequency of exchanges on medications during primary care encounters. *Patient Education and Counseling* 64 (1-3) 207-16.

Rycroft-Malone, J. (2004). PARIHS framework-A framework for guiding the implementation of evidenced-based practice. *Journal of Nursing Care Quality*. 19(4), 297-304.

Sales, A.E., & Schalm, C. (2010). Data for improvement and clinical excellence: Protocol for an audit with feedback intervention in long-term care. *Implementation Science* 5, 74.

Sarkar, U., Lopez, A., Maselli, J.H., & Gonzales, R., (2011). Adverse drug events in the U.S. adult ambulatory medical care. *Health Research and Educational Trust* 46(5). doi 10.1111/j.1475-6773.2011.01269.x

Stratis Health (2014). Understanding and improving medication reconciliation between hospitals and nursing homes: Patient safety risk and cost in care transitions; White Paper. Retrieved from: http://www.stratishealth.org/documents/Stratis-Health-medication-reconciliation-white-paper-2014.pdf

Tache, S.V., Sonnichsen, A., & Ashcroft, D.M. (2011). Prevalence of adverse drug events in ambulatory care: A systematic review. *The Annals of Pharmacotherapy* 45:977-89. doi 10.1345/aph.1P627.

Tam, V.C., Knowles, S.R., Cornish, P.L., Fine, N., Marchesano, R., Etchells, E.E., (2005). Frequency, type and clinical importance of medication history errors at admission to

hospital: A systematic review. *Canadian Medical Association Journal* 173, 510-515. doi 10.1503/cmaj.045311.

Tarn, D.M., Heritage, J., Paterniti, D.A., Hays, R.D., Kravitz, R.L., & Wenger, N.S. (2006). Physician communication when prescribing new medications. *Archives of Internal Medicine* 166 (17), 1855-62.

Taylor, M.J., McNicholas, C., Nicolay, C., Darzi, A., Bell, D., Reed, J.E., (2013). Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. *BMJ Quality & Safety; the international journal of healthcare improvement.* doi:10.1136/bmjqs-2013-001862

The Joint Commission. (2015). National Patient Safety Goals Effective 1/6/2015. Hospital Accreditation Program. Retrieved from http://www.jointcommission.org/assets/1/6/2015_BHC_NPSG_ER.pdf

Ullrich, P. M., Sahay, A., & Stetler, C. B. (2013). Use of implementation theory: A focus on PARIHS. *Worldviews in Evidence-Based Nursing*, 2014; 11:1, 26-34.

Varkey, P., Cunningham, J., & Bisping, S., (2007). Improving medication reconciliation in the outpatient setting. *The Joint Commission Journal on Quality and Patient Safety,* 33(5).

Appendix A

Table 2

Evidence Rating Summary: Medication Reconciliation for Patients in an Outpatient Behavioral Health Clinic

	Author	**Date**	**Evidence Type**	**Sample & Sample Size**	**Results/ Recommendations**	**Limitations**	**RATING** **Strength** / **Quality**
1	Gleason, Brake, Argramonte, & Perfetti	2012	Toolkit for medication reconciliation at transitions and clinical handoffs (MATCH)	National Guideline from the Agency for Healthcare Research and Quality (AHRQ)	Toolkit forms, information and processes can be adapted & used in any healthcare practice to decrease patient harm secondary to medication errors	None known	Level I / A

	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING Strength / Quality
2	Gleason, McDaniel, Feinglass, Baker, Lindquist, Liss & Noskin	2010	Quantitative Non-experimental (Descriptive Study)	Large N=651	35.9% of study patients experienced 309 order errors; 85% of patients had errors originate in medication histories; and almost half of the errors were omissions. 52.4% of patients required intervention to avoid harm; 11.7% of errors could cause possible harm	Results Cannot be generalized beyond hospitalized medical patients	Level III

	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING Strength Quality
3	Greenwald, Halasyamani, Greene, LaCivita, Stucky, Benjamin, Reid, Griffin, Vaida, & Williams	2010	Qualitative Study Proceeds of a stakeholder conference	Experts representing 26 organizations committed to Medication reconciliation	Developed 10 steps to achieve meeting the 2005 Joint Commission goal for National Patient Safety Goal #8 to minimize harm from adverse medication discrepancies in transition through the health system	Not a quantitative or mixed methods study—expert opinion only	Level III A

	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING Strength Quality
4	Hutchinson, Sales, Brotto & Bucknall	May 2015	Quasi-experimental design 2 matched units: one control and one intervention	174 staff on 4 separate hospital units	Describes the SMART tool. Safe Medication Audit Reporting Tool uses medication documentation audits with weekly reports on medication errors assessed. Implemented a feedback report to alert nurses to medication errors	Used a single site Small N Behavioral changes may occur secondary to multiple outside variables	Level II B

	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING Strength Quality
5	Ivers, Jamtvedt, Flottorp, Young, Odgaard-Jensen, French, O'Brien, Johansen, Grimshaw, & Oxman	2012	Review of randomized trials using audit and feedback as the main study focus in order to enhance quality improvement strategies in professional practices.	Review of 140 studies with a Risk Difference adjusted for baseline performance	Use of audit and feedback has shown to be effective in positively impacting behavioral change in professional practice	Some bias meaning? regarding use of printed material as part of studies Inconsistency in the studies; chose to exclude studies without baseline measurements	Level I A

	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING Strength Quality
6	Lee, Nishimura, Ngu, Tieu, & Auerbach	2014	Cross sectional study using descriptive statistics	N=82 Adult patients in a pre-operative clinic 87% response rate	Defined medication discrepancies Patient medication list had a median of 6 medications including prescription, nonprescription herbal and vitamin Most patient lists were incomplete 87% of patient created their medication list without input from a provider	Small sample size of pre-surgical patients, cannot be generalizable to other populations Did not verify accuracy of what? staff or EHR	Level III C

	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING Strength Quality
7	Sarkar, Lopez, Maselli, & Gonzales	2011	Secondary data analysis from 2 nationally represented probability sample surveys	13.5 million adverse drug related events from 2005-2007 An estimated 4.5 million ambulatory visits involve an adverse drug event annually	72%of the adverse events were in out-patient settings. Of the out-patient visits 60% of the adverse events occurred in primary care and 40% occurred in specialty practices. Need further studies on best practices in teaching medication administration	No identification of adverse medication events that did not illicit medical attention. Limited specific data available in large national surveys One individual could be counted multiple times	Level III B

	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING Strength Quality
8	Tache, Sonnichsen, & Ashcroft	2011	Retrospective and Prospective Review	Review of 43 studies	Adverse drug events are common in outpatient settings with estimates of between 16- 41.5% ADEs are preventable errors. More research is required in finding the underlying etiology.	Review included research in 9 different countries which may not be generalizable	Level IV A

	Author	Date	Evidence Type	Sample & Sample Size	Results/ Recommendations	Limitations	RATING Strength Quality
9	Varkey, Cunningham & Bisping	2007	Controlled Prospective Trial Quasi-experimental	104 patients	Pt medication lists Pt is the key. Significant decrease in medication discrepancies	No data on long term sustainability In home inspection may be more accurate than patient report	Level II B

Medication Reconciliation Audit Form

Prescribers Initials _____ Week Number or Date _____ Circle Form Used 1 2 3

	Medical Reconciliation	**Pt. 1**	**Pt. 2**	**Pt. 3**	**Pt. 4**	**Pt. 5**
1	Compared accepted clinic form of medications and prescribers EMR. Medication name, dose, route, frequency were documented in the appropriate location of the medical record? (Y/N) Clarification of forms = 1) Avenue 2) MMR 3) Patient account if there is no formal form					
2	Clinic Form and Prescribers EMR comparison was accurate? (Y/N)					
3	Number of total medications (actual # in patients list)					
4	Number of medications requiring reconciliation (# in error)					
5	Updated medication list was provided to the patient at discharge and discussed in the context of continued care and treatment? (Y/N)					
6	Documentation of medication reconciliation was completed? (Y/N)					
7	Total medications for patient (somatic & specialty medications were assessed) (Y/N)					
8	Total medications assessed were for prescribers specialty only (Y/N)					

Comments/Suggestions?