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Best Practice Medication Reconciliation in the Outpatient Setting

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Abstract

Background: Medication safety is a focus of the Joint Commission's National Patient Safety Goals and research supports improved medication reconciliation as a strategy to reduce medication errors and adverse drug events. In a busy, outpatient specialty clinic where patients are routinely considered for high-risk pharmaceutical therapies, a consistent medication reconciliation process is essential for patient safety and positive health outcomes. *Purpose:* To improve consistency of medication reconciliation in this high-risk outpatient setting. *Method:* Based on a gap analysis between evidence-based and current practice, a quality improvement intervention was implemented to increase patient engagement in the medication reconciliation process. A reminder prompt was added to automated appointment notification calls and staff provided verbal cues to patients along with a printed copy of the medication list for review during the check-in and rooming process. A report was created to capture whether medication reconciliation was completed at the same time as provider-patient visits, and rates of reconciliation completions were calculated. *Results:* Prior to implementation of this project, medication reconciliation completion rates were calculated at an average of 35.6% over the three months prior. During the six-week intervention period, reconciliation rates improved in the range of 4.4-10.7% over that of the pre-intervention average rate. Medication list completeness and accuracy, however remain a challenge. *Conclusion:* Increased patient engagement showed a positive effect on medication reconciliation completion rates in the outpatient setting but did not surpass the goal of at least 50% reconciled. Further interventions, including staff training to improve competency in comprehensive, accurate medication reconciliation is warranted.

Keywords: medication reconciliation, adverse drug interactions, outpatient, multi-disciplinary, adverse drug events, medical error

Best Practice Medication Reconciliation in the Outpatient Setting

Since the release of the Institute of Medicine's (IOM) "To Err is Human" report in 1999, the concern about medical errors and their impact on both patient outcomes and healthcare associated costs has increased. One of the IOM's six quality domains cited in their follow up report "Crossing the Quality Chasm" (2001) is that healthcare should be safe. Medication reconciliation has been suggested as a means of improving medication safety. The following project was intended to address the issue of medication safety by improving the medication reconciliation process in an outpatient hematology-oncology clinic setting.

Background

Medication reconciliation is defined as formulating a current and accurate list of all patient medications (The Joint Commission, 2015). The Joint Commission notes that transitions from inpatient to outpatient care are the riskiest times for medication error and has thus highlighted medication safety as one of their National Patient Safety goals since 2005 (2015). Armor, White and Carter (2016) note that transitions of care result in high numbers of adverse drug events, potential adverse drug events, and medication discrepancies. Healthcare costs associated with adverse drug events are significant and may include both medical sequelae and hospital readmission (Polinksi et al., 2016). In a large scale retrospective analysis of the financial implications of medication errors, Bourgeois, Shannon, Valim, and Mandl (2010) noted that adverse drug event incidence resulting in outpatient and emergency department visits averaged around 15.5 per 1000 persons. Additionally, despite increased awareness of medication safety issues, rates were rising in more recent years reviewed (Bourgeois et al., 2010). Polypharmacy

and age greater than 65 were particularly susceptible to adverse drug events requiring medical intervention (Bourgeois et al., 2010).

Approximately 40% of medication discrepancies occur because of poor communication and inadequate medication reconciliation processes (The Joint Commission, 2015). A particularly vulnerable time for discrepancies to occur is during transitions of care, which Center for Medicare and Medicaid Services (CMS) defines as any time a patient's care is moved from one area to another, be it hospital to the rehabilitation setting, primary care to specialty practice, or even when patients are discharged to home (CMS, 2014). Additionally, implementation of more effective medication reconciliation processes across transitions of care is an expectation for accreditation. More importantly, optimizing medication reconciliation processes is a means to provide safer, higher quality care (The Joint Commission, 2015). Medication reconciliation has been shown to significantly decrease the number of medication discrepancies and related adverse drug events (Najafzadeh et al., 2016; Polinski et al., 2016). While the effect medication reconciliation may have on overall healthcare cost reduction remains somewhat unclear, newer research attempts to quantify cost-benefit analysis of medication reconciliation programs to solidify their value (Karapinar-Çarkıt et al., 2017; Najafzadeh et al., 2016).

The Agency for Healthcare Research and Quality refers to this list as the "One Source of Truth" (2012, p.1). This one, inclusive list must consider not only what is ordered for the patient, but also what has been ordered in the past, and most importantly, what the patient is currently taking for medication (The Joint Commission, 2015). Each medication on the list should have all the necessary components for a complete order: right drug, dose, route, frequency and purpose (The Joint Commission, 2015). All disciplines caring for the patient should have access to this singular medication list for safest provision of care (Agency for Healthcare Research and

Quality, 2012). Reconciliation of this list should be completed at all care transitions, but also whenever new medication orders are being written (CMS, 2015; The Joint Commission, 2015). In the outpatient hematology-oncology clinic where this evidence-based project was implemented, patients are frequently receiving specialty (high-risk) pharmaceutical treatments, and so accurate medication reconciliation is even more essential for patient safety.

Literature Review

A review of the literature regarding medication reconciliation was conducted to ascertain best practices for prevention of adverse medication events, with attention to nursing interventions. Searches were conducted using CINAHL, PubMed, Academic Search Premier, and Cochrane databases and the keywords *medication reconciliation, medication discrepancies, adverse drug event, outpatient, nursing, and intervention*. In all, sixty-three different articles were identified. Duplicate articles were excluded, leaving forty-five to be reviewed more closely. Abstracts were screened for possible applications to the outpatient clinic setting, and those that did not apply were excluded. While there are strong, randomized studies supporting the efficacy of medication reconciliation and inpatient interventions, the literature does not strongly address outpatient settings, and those that do are generally of quasi-experimental nature with small sample groups. In the end, fifteen articles that addressed different possible approaches to improve medication reconciliation were included based on the quality of the evidence and application to practice setting. These articles were then reviewed in full and evaluated for strength using the Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) model (Newhouse, Dearholt, Poe, Pugh, & White, 2005). While there was one systematic review rating IA by JHNEBP strength criteria, the majority of articles were rating II A-C due to quasi experimental nature of study design as well as smaller sample sizes.

The evidence regarding the utility of medication reconciliation in preventing adverse drug events and identifying medication discrepancies is strong (Najafzadeh et al., 2016; Polinski et al., 2016). In a systematic review of hospital medication reconciliation and its effect on medication discrepancies and post discharge outcomes, Kwan, Lo, Sampson, and Shojania (2013) determined that evidence does show that medication reconciliation decreases the number of medication discrepancies. By JHNEBP criteria, this systematic review rates IA for its randomization and large sample size (Newhouse et al., 2005). Najafzadeh et al. (2016) estimate that effective medication reconciliation can reduce preventable adverse drug events by almost half and propose this would recoup the cost of reconciliation interventions due to savings in healthcare utilization. While Polinski et al. (2016) agree on medication reconciliation's effectiveness in preventing adverse drug events, the data was less clear as to its direct effect in decreasing hospital readmissions and related cost savings.

Additional studies have looked at the question of which disciplines should be responsible for the medication reconciliation process. Patients being admitted to a university hospital were randomized into groups where either a registered nurse (RN) or pharmacist completed a uniform process for medication reconciliation (Aag, Garcia, & Viktil, 2014). Results showed that both disciplines identified similar rates of medication discrepancies, and the clinical significance of medication discrepancies identified were comparable in both groups (Aag et al., 2014). Though the sample size of 201 was moderate, the randomization of the intervention improves this study to a IIA by JHNEBP criteria (Newhouse et al., 2005).

As opposed to comparing effectiveness of one discipline versus another, nurse-pharmacist collaboration was investigated in a joint medication reconciliation process instituted

for over 500 patients in a tertiary hospital (Feldman et al, 2012). Nursing created a home medication list which was then compared by pharmacy with physician ordered medication list. The study showed that 40% of records had a medication discrepancy, and of these, 70% rated 2 or 3 on the harm scale (Feldman et al, 2012). The moderate sample size and quasi experimental nature of the study rate it IIB by JHNEBP guidelines (Newhouse et al., 2005).

Only a few studies directly addressed the challenges of medication reconciliation in the outpatient setting and tried specific interventions to improve rates and accuracy of reconciliation. Many subscribed to increased patient engagement in the medication reconciliation process, which research shows is an essential component to success (McCarthy et al., 2016; Scnhipper & Labonville, 2016). Varkey, Cunningham, and Bisping (2007) implemented mailed reminders to patients to bring updated medication lists to appointments, along with active patient participation in correcting noted discrepancies in their own electronic medical record. Post interventions medication discrepancy rates decreased by 50% (Varkey et al., 2007). Due to the small sample size (n=104) and quasi-experimental nature of this study, it rates IIB by JHNEBP criteria (Newhouse et al., 2005).

In a larger and longer-term study, Weingart et al (2007) looked at the effects of providing patients their medication list on clinic check-in for their review. Prior to intervention, the clinic estimated 81% of medication lists contained at least one discrepancy (Weingart et al, 2007). Over two years more than 24,000 medication lists were reviewed and 90% of those with identified discrepancies were reconciled in the medical record (Weingart et al, 2007). While quasi-experimental in nature, the sample size and length of intervention strengthen this evidence to IIA by JHNEBP criteria (Newhouse et al., 2005).

Schnipper and Labonville (2016) note that use of social marketing, community engagement and health information technology such as patient portals are also effective ways to involve patients and caregivers in the process of medication reconciliation. In an intervention to better capture accurate medication reconciliation in a homeless population, one clinic found success with a "Pack Your Bag" campaign where patients were provided a bag to keep their medications in and encouraged to bring this bag along to all healthcare appointments (Alexander, Matzke, & Goode, 2012).

Staff engagement regarding the importance of medication reconciliation was also investigated. An intervention aimed at resident physicians who rotated through an outpatient pain clinic setting included education regarding the importance of medication reconciliation and the process for completing reconciliation (Neufeld, Fernandez, Christo, & Williams, 2013). Positive reinforcement was given when completion rates improved (by way of public acknowledgement) (Neufeld et al., 2013). Post intervention completion rates were 82%, an impressive four-fold improvement from preintervention compliance rates (Neufeld et al., 2013). Due to the small sample size (n=36) and quasi-experimental nature of this study, it rates IIB by JHNEBP criteria (Newhouse et al., 2005). McCarthy et al. (2016) conducted their own investigation into how to improve medication reconciliation and found that providing support staff education and promoting their engagement was essential to improved medication reconciliation processes.

Best utilization of electronic medical records (EMR) in supporting medication reconciliation processes has also been a focus of research. Schnipper et al. (2012) instituted a medication reconciliation application in ambulatory clinics aimed to improve post hospitalization medication reconciliation. Although indicative of quality processes that are possible with

electronic medication records, the study was narrow in its application to offices that are synched in the same system as area hospitals and was not created for general patient population use. By JHNEBP criteria, the study ranks IIC (Newhouse et al., 2005). The use of secure messaging via patient portals where patients can self-edit their medication record was investigated as a new option for ongoing medication reconciliation, but due to the mixed demographic of healthcare patients this does not yet appear a good generalized intervention (Raghu, Frey, Chang, Cheng, Freimund, & Patel, 2015

While a wealth of research supporting utility of medication reconciliation to decrease medication discrepancy exists, it most centrally focuses on inpatient transitions and initial post discharge time. Outpatient settings have been minimally studied. Due to their significantly different nature from inpatient settings, further investigation into best practices for most accurate medication reconciliation processes is warranted (McCarthy et al., 2016). The research does support the importance of multidisciplinary involvement in the reconciliation process for best outcomes, and involvement of patients directly is also strongly promoted (McCarthy et al., 2016). EMRs are a wealth of opportunity to be explored, but due to the variability in EMR programs from site to site, cannot be the primary focus yet in medication reconciliation.

Theoretical Framework

The project was rooted in the Health Belief Model (Appendix A), which attempts to understand why patients make decisions about health behaviors that they do (Current Nursing, 2012; Hockbaum, Rosenstock, & Kegels, 1952). The authors of the HBM propose that to engage in health promoting behaviors, patients will consider various factors including severity of the health risk, their perceived susceptibility to said risk, and how easy or difficult preventative action might be (Current Nursing, 2012; Hockbaum et al., 1952). In later versions, it is

suggested that for patients to participate in health promoting behaviors, they must believe in their own ability to affect change on the associated risk (Current Nursing, 2012; Hockbaum et al., 1952).

Goals, Objectives and Expected Outcomes

In this medication reconciliation quality improvement project, the aim was to better engage the patients themselves in the medication reconciliation process, thereby improving accuracy and consistency of completion. By educating patients of the importance of medication reconciliation and their role in communicating changes to their medication regime, the aim is to improve the process in this high-risk outpatient setting. Additionally, by advertising our quality improvement project outcomes as we went along, the hope was to reinforce to patients the positive effect their participation yields.

Per the Meaningful Use Measure put forth by CMS (2012, 2015), the expectation is that medication reconciliation be completed in at least 50% of relevant patient encounters which include transitions of care, any time when new medications are being considered, or it has been a long time between appointments. In this clinic, patients were being considered for new medication therapy most of the time, so medication reconciliation was prudent at all patient visits. The denominator was defined as the total number of relevant patient encounters and the numerator was defined as the actual number of encounters where medication reconciliation took place. As an internal benchmark, the initial documented completion rate of medication reconciliation per relevant patient encounter in the clinic was approximately 35%. The initial goal of this project was to surpass the 50% mark as suggested by CMS (2012), with hopes to progress to the ideal 100% completion when a working best process for medication reconciliation in the clinic had been established.

Project Design

The DNP project was a quality improvement project that focused on process improvement and hoped to increase accuracy and consistency of medication reconciliation in a busy, high-risk clinic setting. Quantitative reports were mined from the existing clinic EMR to assess rates of medication reconciliation completion prior to, during and post intervention. By engaging both staff and patients in a clarified, evidence-based approach to medication reconciliation, we hoped to decrease risk and improve patient safety in regard to medication therapy.

Project Site and Population

The setting for the quality improvement project was a busy, outpatient hematology-oncology clinic embedded in a community hospital in southern New Hampshire. The clinic has four to five providers seeing approximately 12-15 patients apiece each weekday, for a total of approximately 300 patient encounters each week. Due to the nature of the setting, the patient subjects are high acuity, with complex health issues, and very frequently require high risk medication intervention for their disease. Data regarding completion of medication reconciliation were obtained from the EMR, with patient specific identifiers omitted, thus protecting subject confidentiality. Research supports utilization of data from the EMR as a reliable method to capture change in medication reconciliation quality and consistency over time (Kern et al., 2017). As this was a quality improvement project, and the usual documentation system was utilized for data collection, it was not necessary that patients undergo individual consenting for this project.

Implementation Plan

Based on the literature, the DNP student implemented the following medication reconciliation quality improvement project:

1. Patients were informed of the expectation that they come to clinic prepared to update their medication list with any changes.
2. Patients were prompted to bring updated medication lists when called by the automated appointment reminder system two business days ahead of their appointment.
3. A copy of the electronic medication list was provided at patient check-in, with a verbal prompt to review and make changes as necessary.
4. Medical assistants prompted patients to review medication list when they were placed in examination rooms to see providers.
5. The provider seeing the patient used this same list to initiate an in-depth medication history interview.
6. Finally, accepted final changes (or notation of no changes) were updated by providers, or delegated to nursing staff to adjust in the EMR and marked as "reconciled".

As per usual protocol, all medication lists were reviewed for accuracy and drug interactions with any new medication orders by the clinic's pharmacy team. The goal of the project was to align the process of medication reconciliation in the clinic with evidenced best-practice, and to adhere to this process in more consistent fashion. This intervention was aimed to improve the clinic's rate of completion and documentation of medication reconciliation at every patient encounter, to help prevent adverse drug events and promote best patient outcomes. A simple run chart showing the reconciliation rates each week was an effective tool to show staff and patients how things were going. The benefit of a run chart is that it shows trends of change over time. By posting a run chart visibly in the clinic and updating it regularly with most recent

outcome percentages, both staff and patients were reminded that their efforts were making a difference.

Measurement Instruments

To evaluate the DNP project, the Meaningful Use Measure for medication reconciliation put forth by CMS was utilized (2012, 2015). Number of medication reconciliation completions per relevant patient encounters was assessed via data mining from the EMR. According to CMS, relevant patient encounters include not only transitions of care, but also any patient encounter where medications are to be adjusted or prescribed (2012, 2015). As these parameters apply to essentially every patient visit in the hematology oncology clinic for this project, reports comparing number of medication reconciliation completions per total number of patient visits were utilized.

Data Collection Procedures

The clinic's in-house information technology representative assisted in creating a report to capture completed patient visits and whether medication reconciliation has been marked as "reconciled" in the EMR on these same visit dates. This data collection was reliant on staff manually toggling the "reconciled" button whenever medication lists are updated in the EMR, thus the importance of pre-intervention staff education. Reports were run pre-intervention, weekly throughout intervention, and post intervention. To ensure reliability of providers toggling the "reconciled" button, each week one reconciled medication list was confirmed with the patient directly to ensure its accuracy.

Data Analysis

Rates of medication reconciliation completion were calculated by dividing number of completed reconciliations by total number of visits completed over a given time frame. Pre-

intervention rates were calculated, as well as weekly rates throughout the six-week intervention in hopes of assessing for improvements. This allowed for ongoing rates of change to be calculated during the intervention period. Post intervention reconciliation rates were compared to pre-intervention rates to ascertain overall percentage rate of change.

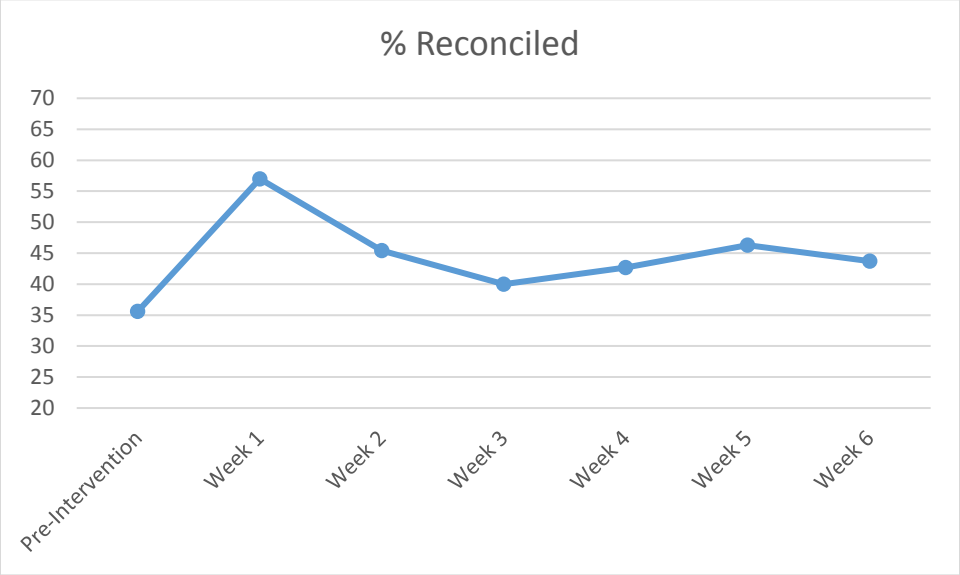
Ethics and Human Subjects Protection

The DNP project proposal was submitted along with a determination of human subject research form to the UMass Amherst, and the project was confirmed as quality improvement and so was exempt from IRB review requirement. At the implementation facility, the proposal was reviewed by the Professional Nursing Development Council and again was determined to be quality improvement in nature and thus did not require facility IRB review. Patient specific data was not required when obtaining data for reconciliation rate calculations. Reports were run utilizing visit dates, a visit completion "capture" that happens in the EMR to confirm to billing staff the visit occurred, and a flag for the medication reconciliation toggle rather than requiring any patient identifying information. Therefore, informed consent was not required for this intervention and protection of patient health information was maintained. The information technology specialist for the clinic EMR assisted in creating said report format, and this DNP student was able to run the report at planned intervals. All EMRs were password protected by credentialed staff who are clearly identified in record documentation. Staff maintained HIPPA privacy standards as required by the facility and greater accrediting bodies in healthcare.

Results

Reconciliation rates were calculated for the three months prior to the project implementation and averaged to a rate of 35.6%. After initiation of the intervention, reconciliation rates jumped to 57% in the first week of the project. Thereafter, reconciliation

completion rates declined into the 40-46% range for the remainder of the six-week intervention. These rates represent anywhere from a 4.4% to 10.7% increase in reconciliation rates from the pre-intervention average. A run chart of reconciliation rates was displayed in the clinic for patient and staff viewing:



Outcomes

While medication reconciliation rates improved during this intervention, they did not surpass the initial goal of more than 50% reconciled. Further intervention will be required to meet this initial goal, as well as progress toward the ultimate goal of 100% medication reconciliation completion in this high-risk, outpatient clinic.

Facilitators and Barriers

Initially, there were some barriers to implementation. The process for project review and exemption from the facility IRB was a very slow moving one, and required multiple outreaches, meetings and resubmissions of documentation to various committee members. Once approved, the implementation site was in process of installing an upgrade to the current EMR, which further deterred initiation of the project as report capabilities were out of function for a few days.

Between the time the project proposal was submitted and the time for implementation came about, the process for patient reminder calls was transitioned from clinic staff calling manually, to an automated appointment reminder call. The process for changing the script relayed to patients through this automated call was an additional time delay in implementation of the project.

Facilitators for the project included full support for medical and clinical directors in the implementation site from the very beginning of project proposition; the philosophy that medication reconciliation was instrumental in lowering risk for adverse drug events was shared wholeheartedly by clinic leadership who were very invested in this project from the beginning. The implementation site facility is also very focused on quality improvement projects currently, and so the timing of this DNP project was fortunate in that it aligned with the forefront of facility priorities.

Discussion

The overall reconciliation completion rates for the clinic improved during the implementation from those prior to it. The significant jump in reconciliation rates during the first week of the intervention seems likely in some part due to the staff's renewed engagement in the process after roles had been reinforced and the project introduced. Thereafter, the stabilization of improved reconciliation rates is suggestive of an ongoing effect of the intervention itself.

Part of the intervention proposed included a weekly audit of a reconciled medication list to investigate its accuracy. This was proposed to ensure staff were not just toggling "reconciled" without actually reviewing the medication list with patients. These audits showed that changes had most often been made when lists were marked "reconciled", suggesting staff veracity of attempting reconciliation. However, in review it was clear that these lists often contained

incomplete medication orders or were not entirely accurate to other documentation of patient current medications (such as that from the patient's outside pharmacy). It would seem, then, that staff would benefit from more specific training as to how to complete a comprehensive and accurate medication reconciliation interview.

Conclusion

Medication reconciliation has been shown to decrease medication discrepancies and adverse drug interactions (Kwan et al., 2013). In a high-acuity hematology-oncology clinic, patients are frequently treated with medication interventions and thus an accurate medication list is essential to preventing adverse outcomes. Evidence supports that by improving the quality, consistency and accuracy of the clinic's medication reconciliation process, patient safety and best care outcomes will be maintained. Using the Health Belief Model as a framework, this DNP project aimed to improve consistency of medication reconciliation completions by increasing patient engagement in the process. By engaging patients regarding the importance of maintaining an accurate medication list and implementing a process that prompts them to participate in the reconciliation of said medication list, this DNP project provided patients the opportunity to affect change in their own health care safety. Improvement in medication reconciliation rates that sustained throughout the intervention period suggest that the strategy of increased patient engagement in the medication reconciliation process was an effective one, but the goal of reconciliation rates over 50% was not achieved. Further, staff training to improve accuracy and comprehensiveness of medication reconciliation efforts is warranted. Future inquiries might include whether a dedicated staff member, with thorough medication reconciliation training, would accomplish more consistent and accurate medication lists in the outpatient setting.

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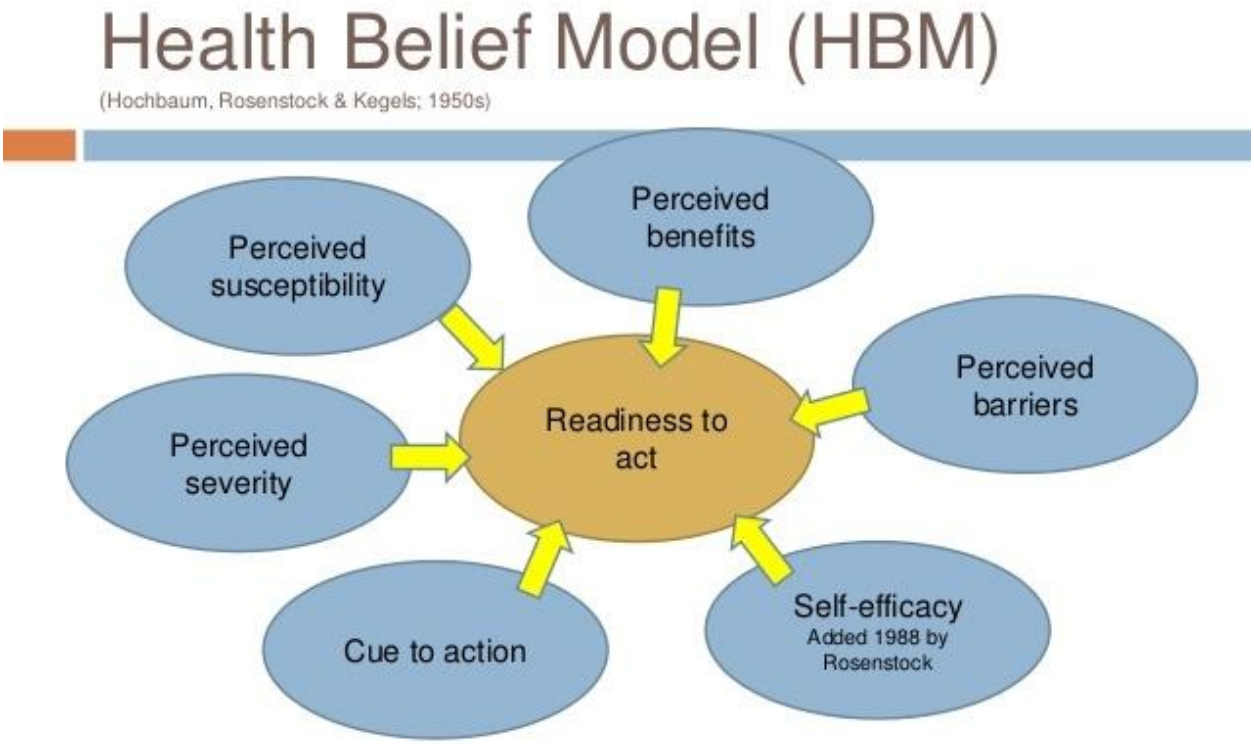
Appendix A


Health Belief Model (HBM)
(Hochbaum, Rosenstock & Kegels; 1950s)
Perceived susceptibility
Perceived benefits
Perceived barriers
Perceived severity
Readiness to act
Cue to action
Self-efficacy
Added 1988 by Rosenstock

Appendix B

Table 1

Medication Reconciliation Rates

Week	Visits Completed	# Reconciled	% Reconciled	% difference
Predata (3mos pre-intervention)			**Average 35.6**	
Week 1	**321**	**183**	**57.0**	**+ 21.4**
Week 2	**337**	**153**	**45.4**	**- 11.6**
Week 3	**292**	**117**	**40.0**	**-5.4**
Week 4	**274**	**117**	**42.7**	**+2.7**
Week 5	**244**	**113**	**46.3**	**+3.6**
Week 6	**254**	**111**	**43.7**	**-2.6**