Title of Project: Improving Safety After Hospitalization in Older Persons on High-Risk Medications

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STRUCTURED ABSTRACT

Purpose: To evaluate the effectiveness of a clinical trial focused on older patients recently discharged from the hospital who were prescribed medications within one of three high-priority, high-risk drug classes (anticoagulants, diabetes agents, and opioids) to reduce the risk of clinically important medication errors.

Scope: The National Action Plan for Adverse Drug Event (ADE) Prevention identified three high-priority drug classes as key targets for reducing the risk of drug-related injuries: anticoagulants, diabetes agents, and opioids.[1] These medication classes account for the greatest number of measurable drug-related harms to patients, and many ADEs associated with these medications are considered preventable.[2,3]

Methods: A randomized clinical trial of a multifaceted medication error and ADE reduction intervention, with a special focus on in-home assessment by a clinical pharmacist. The primary outcome of interest was clinically important medication errors, a composite outcome comprised of preventable or ameliorable ADEs and potential ADEs due to medication discrepancies or nonadherence. Secondary outcomes included (1) preventable or ameliorable ADEs; (2) potential ADEs due to discrepancies or nonadherence; and (3) preventable or ameliorable ADEs judged to be serious, life-threatening, or fatal. For the purpose of this study, outcomes of interest were not limited just to the high-risk medications (anticoagulants, diabetes agents, and opioids) but included all medications.

Results: In total, 361 subjects were enrolled into the trial; 180 were randomly assigned to the intervention group, and 181 were randomly assigned to the control group. No between-group differences were found for either the primary or secondary outcomes.

Key Words: Clinical Trials, Care Transitions, Medication Safety, Health Systems Intervention

PURPOSE

The overarching objective of this project was to pursue a clinical trial focused on **older patients** (a priority population for the Agency for Healthcare Research and Quality) who were recently discharged from the hospital and who had been prescribed medications within one of the three high-priority, high-risk drug classes (anticoagulants, diabetes agents, and opioids) to reduce the risk of clinically important medication errors. The specific aims for our study were:

Aim 1: To adapt and integrate existing "best-practice," evidence-based medication safety tools, resources, and approaches into a cohesive, multifaceted intervention to reduce the occurrence of clinically important medication errors in older adults recently discharged from the hospital who were using one or more of the three high-priority, high-risk drug classes (anticoagulants, diabetes agents, and opioids).
Aim 2: To assess the impact of the multifaceted intervention on the incidence of clinically important medication errors, employing a randomized, controlled trial design.
Aim 3: To conduct a process evaluation assessing intervention fidelity, adaptation, mechanisms of impact, essential components, and the influence of contextual factors.
Aim 4: To create (1) a plan for disseminating study findings to stakeholders who might implement the intervention or make decisions about its future use and (2) an implementation toolkit for those who wish to implement the intervention in practice.

SCOPE

Transition from Hospital to Home: Extraordinarily High-Risk for Older Patients: Up to one fifth of older patients suffer an adverse event within weeks of leaving the hospital, and many of these events may be preventable.[4,5] The risk for adverse drug events (ADEs), defined as injury due to a medication, is especially high for older patients as they transition from the inpatient to the outpatient setting.[6,7] Our research team has reported that nearly one in five older adults newly discharged from the hospital experience an ADE and that medication prescribing and monitoring errors are particularly common during this high-risk, post-hospital discharge period.[8] In addition, we have reported that many patient-related medication errors in older adults involve certain high-risk medication categories, including diabetes agents and anticoagulants, and that the majority of these errors leading to ADEs relate to administering the medication, modifying the medication regimen, or not following clinical advice provided to the patient about use of the medication.[9] Patients who may be at special risk for medication errors and ADEs include those taking greater numbers of different medications and those with a higher burden of comorbidity.[10] Patients with impaired cognitive function and low health literacy may also be at especially increased risk.[11]

The National Action Plan for Adverse Drug Event Prevention: Targeting High-Risk Drug Classes: The National Action Plan for Adverse Drug Event Prevention identified three high-priority drug classes as key targets for reducing the risk of drug-related injuries: anticoagulants; diabetes agents (insulin and oral agents); and opioids.[1] These medication classes were chosen because they account for the greatest number of measurable drug-related harms to patients, and a substantial proportion of ADEs associated with these medications are considered preventable.[2,3,12] Insulins, opioid-containing analgesics, and warfarin are among the most common medications implicated in emergency department visits for outpatient adverse drug events,[3] especially among patients aged 65 or older.[12] These are also the most common medications implicated in emergency hospitalizations for ADEs in older adults.[2] Budnitz, Shehab, and colleagues have suggested that improved management of medications in these categories has the potential to reduce hospitalizations for ADEs in older adults.[2] Recent research findings have highlighted that adverse events related to diabetes agents are a growing concern among older patients. Lipska et al. have reported that hospital admissions for hypoglycemia now exceed those for hyperglycemia in Medicare beneficiaries.[13] Redberg and others have commented that older patients are more likely to experience adverse events related to overtreatment of diabetes mellitus.[14,15] Geller, Budnitz, and Shehab have reported that rates of emergency department visits and subsequent hospitalizations for insulin-related adverse events are particularly common among those aged 80 or older,[16] and this should be considered in decisions to prescribe and intensify insulin therapy.[17] Insulin product mix-ups are suggested as important targets for hypoglycemia prevention efforts.

Clinically Important Medication Errors: As defined in the AHRQ Program Announcement for this award, PA-14-002, "an ADE is an injury resulting from medical care involving medication use. Identifying something as an ADE does not imply error, negligence, or poor quality care. It simply indicates that an undesirable clinical outcome resulted from some aspect of diagnosis or therapy and not [from] an underlying disease process." A "preventable" ADE is a drug-related injury relating to a medication error. Although some ADEs are not entirely

preventable, their duration or severity could be reduced; such events have been characterized as "ameliorable" ADEs. Other types of medication-related problems, referred to as "potential" ADEs, may present during the post-hospital discharge period. Though these situations may not yet have caused any injury to the patient, they have the potential to cause future harm if not addressed. These potential ADEs include discrepancies in the patient's medication regimen[18,19] or episodes of nonadherence with a high likelihood of potential harm. Taken together, preventable or ameliorable ADEs and potential ADEs comprise "clinically important medication errors," an important and meaningful target for patient safety interventions, as over 50% of patients discharged from the hospital experience one or more clinically important medication errors within weeks after hospital discharge.[20] Clinically important medication errors were the primary outcome of interest in this project.

Improving Medication Safety: Pharmacist-Based Interventions: Few high-quality studies have rigorously examined the impact of pharmacist-based interventions on medication safety in older adults in the ambulatory setting. Lee and colleagues conducted a systematic review of US pharmacist interventions on older adults and resulting patient-oriented outcomes.[21] To be included, studies had to compare outcomes of a patient-level pharmacist intervention in older adults with those of alternative care. The pharmacist intervention needed to have the intention of improving therapeutic outcomes, increasing medication adherence, reducing hospitalizations, or improving medication safety. Of 20 studies ultimately included in the systematic review, only six were RCTs, and only one focused on ADEs and medication safety. Although inappropriate prescribing was reduced, there was no statistically significant difference in the percentage of patients experiencing an ADE in the intervention compared with the control group.[22]

Among studies not limited to older patients, some have suggested medication safety benefits from inpatient pharmacist-based interventions at the time of hospital discharge,[23,24] while others have not. For example, in a randomized trial of adults hospitalized with acute coronary syndromes or acute decompensated heart failure, a multicomponent intervention comprised of pharmacist-assisted medication reconciliation at the time of discharge, including inpatient pharmacist counseling, low-literacy adherence aids, including a pill box and illustrated daily medication schedule, and individualized telephone follow-up after discharge failed to demonstrate a significant reduction in clinically important medication errors.[20] The investigators emphasized that their findings "highlighted the difficulty of improving medication safety during the transition from hospital to home," reporting that clinically important medication errors affected over 50% of study subjects during the first 30 days after hospital discharge. The failure of this intervention has been attributed to a number of factors, including inadequate communication and collaboration with the primary care team of the patient during this vulnerable transition period.[25] The lack of targeting of vulnerable, high-risk groups most likely to benefit, such as persons with cognitive deficits or poor health literacy, has also been highlighted. Kaboli and Frenandes have convincingly argued that providing the same intensity of a medication safety intervention "to every patient is neither efficient nor cost-effective." It is essential "to optimally channel the patients who need the most attention and can get the greatest benefit [from such interventions]."[26]

Setting: Reliant Medical Group is a large, multispecialty group practice located in Central Massachusetts. The group practice employs 265 physicians and 80 mid-level providers and provides care for over 180,000 patients at 23 office locations across Central Massachusetts; 35,972 patients cared for by Reliant Medical Group are age 65 or older. The vast majority of these patients are with Medicare Advantage (over 80%), and the remainder are provided care under an Accountable Care Organization model. The practice has used an EHR since 2006 (Epic Systems Corporation). Epic's EHR, EpicCare®, is ARRA certified by the Certification Commission for Health Information Technology (CCHIT). Reliant Medical Group has received Patient-Centered Medical Home recertification from the National Committee for Quality Assurance, achieving level-3 status. Reliant Medical Group has been the setting for many of our prior studies relating to medication safety in the ambulatory setting, beginning more than a decade ago.[8,9,27-31]

Essentially all patients cared for by Reliant Medical Group are hospitalized in a 321-bed general medical and surgical hospital in Central Massachusetts. Hospital care is delivered only by Reliant Medical Group hospitalists. Only patients discharged from this hospital were eligible to participate in the study. We determined that, although medication reconciliation procedures routinely happened at the time of hospital discharge, no additional medication safety interventions were systematically employed and there were no hospital-initiated efforts extending into the outpatient setting after hospital discharge that directly targeted medication safety. All Reliant Medical Group patients on warfarin were managed by an outpatient anticoagulation service of the medical group. However, there was no direct line of communication between the hospital and the

anticoagulation service, and connecting or reconnecting a recently discharged warfarin-treated patient with the anticoagulation service was the sole responsibility of the primary care provider.

Participants: The study population was originally derived from patients age 65 or older who were cared for by Reliant Medical Group. After 8 months of lower than expected recruitment rates, eligibility criteria were changed to include those age 50 years or older after review and approval of the DSMB for the study. The University of Massachusetts Medical School approved this change in the study protocol.

Inclusion criteria were (1) 50 years of age or older at the time of discharge from the primary hospital utilized by the medical group and discharged to home; (2) prescribed at least one medication in one of three high-risk drug categories (anticoagulants, diabetes agents, and opioids) at the time of hospital discharge; and (3) having an additional risk factor that raises the potential for medication safety concerns (prescribed two or more high-risk medications, low health literacy, having a caregiver, nonadherence to prescribed medication regimen, or polypharmacy [defined as being prescribed $\geq$ seven medications]).

Exclusion criteria were (1) plans to enroll in hospice upon discharge; (2) discharged following hospitalization for a psychiatric condition; (3) discharged to a skilled nursing facility, rehabilitation hospital, or nursing home; and (4) incapable of providing informed consent and no proxy available.

METHODS AND RESULTS

Below, we present the methodology and results for each respective study aim.

Aim 1: To adapt and integrate existing "best-practice," evidence-based medication safety tools, resources, and approaches into a cohesive, multifaceted intervention.

AIM 1: METHODS

The intervention developed was composed of four key components: (1) in-home assessment of high-risk patients by a clinical pharmacist; (2) best-practice, evidence-based medication safety tools and resources targeted to high-risk patients and their caregivers; (3) communication with the primary care team via the electronic health record (EHR) regarding concerns relevant to the use of high-risk medications as well as other medication safety concerns; and (4) a follow-up phone call by the pharmacist to the patient and/or caregiver within 14 days of the home visit.

Component 1 – Pharmacist In-Home Visit: Within 4 days of hospital discharge, patients randomized to the intervention arm of the study received an in-home visit from a pharmacist timed to coincide with planned administrations of high-risk medications. The home visits had three components: (1) medication review; (2) observation of medication organization and administration; and (3) in-depth patient and caregiver discussions about challenges to safe medication use. Methods used for direct observation to identify medication administration errors were modeled on approaches used across various clinical settings by Flynn and colleagues.[32,33] The clinical pharmacist performing the intervention had access to the EHR of the patient, including the hospital discharge summary and the discharge medication list.

For medication reconciliation, the clinical pharmacist had access to the EHR of the patient, the hospital discharge medication list, and the discharge summary for each patient. In order to assess for medication discrepancies, the pharmacist used the Medication Discrepancy Tool.[18,34] The Medication Discrepancy Tool permitted the pharmacist to identify the discrepancy, document the patient and system-level contributors to the error, and plan for resolving the error.

The clinical pharmacist first determined who was responsible for the tasks related to medication management (the patient, a caregiver, or both). In the observation of medication organization and administration, proficiency had to be demonstrated in multiple tasks (see **Table 1**). The clinical pharmacist reviewed each of these tasks and remediated as needed. The patient, caregiver, or both read and interpreted labels of medications and showed how medications were organized in a pill organizer. This aspect was important, as our prior work suggested that even using pill organizers can lead to medication errors that lead to ADEs.[9] The study also provided pill organizers at no cost to the patient if the patient was not already using one.

Table 1. Pharmacist In-Home Visit Assessment Areas

Patient/Caregiver Tasks	Pharmacist Assessment
Demonstrates safe medication storage and organization	• Observes for mix-ups in patient's medication storage and organization • Observes for unsafe access to medications for patients with cognitive, physical, and/or visual impairment

Patient/Caregiver Tasks	Pharmacist Assessment
Reads and interprets labels of all OTC and prescription medications	• Medication literacy
Organizes all oral medications into pillbox accurately	• Notes accuracy in number of pills and timing; assesses for duplicate or missing medications
Cuts pills as required	• Observes for skill/accuracy
Describes 24-hour medication administration of pills	• Assesses for potential for missed doses or overuse of medications • Assesses use of tools (timers, routines) to facilitate timing • Assesses use of documentation if multiple caregivers are involved in medication administration • Assesses for interactions affecting bioavailability
Describes approach for missed doses	• Assesses for inappropriate doubling-up
Use of "as needed" medications	• Assesses knowledge of scheduled vs "as needed" medications and how much can/should be taken in a 24-hour period of time
Describes weeklong medication management for warfarin and other medications with varying daily dosage	• Assesses for accurate medication management
Administers injectable medications (insulin)	• Notes storage/refrigeration of insulin and ability to draw up and inject
Describes refill process	• Assesses for barriers to filling prescriptions (multiple pharmacies, cost barriers, and waiting too long to obtain refills)

For medications such as warfarin, which might have required varying doses on different days of the week, the patient also had to describe management over a full week, and this was compared with instructions provided at the time of discharge and also reconciled with any new instructions provided by the anticoagulation service. It was also confirmed that the patient had connected or reconnected with the anticoagulation service subsequent to hospital discharge. The pharmacist also queried the patient/caregiver about special situations, such as handling missed doses and overdoses.

Interviews were used to identify patients' and caregivers' perceptions of barriers to safe home use of medications, with particular relevance to high-risk medications (anticoagulants, diabetes agents, and opioids), and to identify possible prior medication errors occurring in the home. Knowledge gaps and misconceptions that may contribute to medication errors, perceptions of barriers to using medications as prescribed, and recommendations for changes that would enhance medication safety were carefully explored.

In the case that a home visit could not be conducted within the 4-day period (e.g., patient was out of town, had too many competing appointments, did not want someone in the home, etc.), the clinical pharmacist offered to conduct all portions of the intervention that were feasible by telephone (this occurred for only two of the 180 intervention patients). Educational materials normally provided during the in-home visit were mailed to these patients.

Component 2 – Use of Educational Tools Specifically Targeted to High-Risk Patients and Caregivers: The clinical pharmacist used "health literacy universal precautions" in providing instruction relating to all medication safety issues and concerns identified during the observation and interview.[35] During the in-home visit, the clinical pharmacist distributed medication safety educational materials relevant to "high-alert" medications of relevance to our study, many of which were adapted from those developed by the Institute for Safe Medication Practices (ISMP).[36]

From among these resources, the clinical pharmacist selected the set of patient-specific educational materials targeted for each of the high-risk medications focused on in our study. The handouts featured medication instructions, including timing of dose, dietary precautions, situational guidance (what to do when you miss a dose), recommendations for when to contact your doctor, etc. (If the literacy level of the materials was found to be problematic, we had the capability to create low-literacy versions, following guidelines from the universal precautions toolkit and other resources.[37,38]) The clinical pharmacist reviewed materials with the patient/caregiver, using teach-back. Teach-back is a way to confirm that a healthcare provider has explained to patients what they need to know in a manner that the patient understands, and it is an important strategy for ensuring effective communication with patients at all literacy levels.[39-41] The clinical pharmacist also actively encouraged question-asking throughout the home visit.

One of the Co-Investigators (KM) with expertise in health literacy and clinician-patient communication worked with the project manager (JGW) to prepare the clinical pharmacists to be able to communicate effectively with low-literacy patients prior to the first home visit, drawing on a variety of resources (e.g., the universal precautions toolkit and the American Medical Association-sponsored video, "Health literacy and patient safety: Help patients understand"[42]).

Component 3 – Communication with the Primary Care Team via the EHR: Key findings of the in-home visit by the clinical pharmacist were communicated to the primary care team via the EHR immediately after the visit. These messages alerted the primary care physician and the care coordinator to safety issues particularly relevant to the high-risk medication categories (anticoagulants, diabetes agents, and opioids) but also highlighted safety issues relevant to other medications. Messages highlighted problems relating to medication administration and monitoring, listed specific errors that were uncovered, and provided recommendations. For any urgent medication-related problems, including serious medication interactions, side effects, or dosage outside of the usual range, the clinical pharmacist called the primary care provider's office directly.

Component 4 – Follow-Up Phone Call to Patient/Caregiver by Pharmacist: The clinical pharmacist assigned to each patient made a follow-up phone call within 14 days of the home visit. The nature of the phone call was to discuss any interim problems and to review and reinforce instructions provided during the in-home visit. Again, the pharmacist communicated any urgent medication-related problems with the primary care team.

Control Subjects: Subjects in the control group were provided the high-risk medication educational materials via mail.

AIM 1: RESULTS

The study team successfully developed and implemented a multifaceted intervention (described above). See also results for Aim 3 related to intervention fidelity and Aim 4 toolkit incorporating the intervention materials.

Aim 2: To assess the impact of the multifaceted intervention on the incidence of clinically important medication errors employing a randomized, controlled trial design.

AIM 2: METHODS

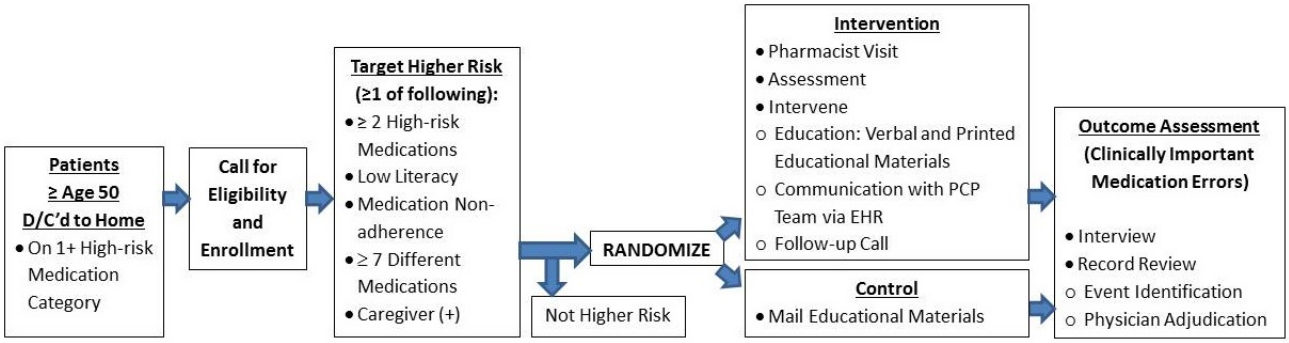
A randomized, controlled trial design (see **Figure 1**, Study Design) was chosen because this allows for the minimization of potential selection bias and confounding that might limit the interpretation of the study findings. We estimated that over 3,000 subjects would meet the age criteria and be available for screening over a 1-year enrollment period. Identification of the "at-risk" population to be recruited into the trial was accomplished through a formal screening process designed to maximize the likelihood that procedures developed through this study could be generalized and scaled to affect the occurrence of clinically important medication errors across a broad range of healthcare systems; to maximize efficiency and effectiveness of the intervention; and to minimize selection bias.

Patients age 50 years or older were identified at the time of hospital discharge to home as having been prescribed a high-risk medication at the time of discharge. This occurred in an automated fashion via the medical group's EHR. Under Stage 2 CMS EHR "Meaningful Use" criteria, hospitals are required to send electronic summary documents containing discharge medications as discrete data. Upon receipt of these data at the time of hospital discharge, the medical group's EHR was configured to identify if the patient's discharge medications included one or more medications in one of three high-risk drug categories (anticoagulants, diabetes agents, or opioids). If the automated "screen" for high-risk drug categories was positive, a message was sent to study staff, who conducted additional medical record review for inclusion criteria.

Potential study subjects were contacted by telephone within 48 hours of discharge by project staff for screening to identify those at increased risk for clinically important medication errors. Those screening positive for <u>any</u> of the additional inclusion criteria, and not meeting any of the exclusion criteria, were deemed "screened in" and were asked if they would be willing to participate. When subjects provided verbal consent, they were randomized. In an attempt to ensure even distribution of subjects into the treatment and comparison groups across two important factors (a. number of high-risk medications the subject was taking (one vs. two or more) and b. month within the year of the study in which the subject was recruited and enrolled), a block-randomization design, stratified on presence/absence of caregiver to ensure balance across arms, was constructed for management within REDCap through the REDCap randomization module.[43] Those randomized

into the intervention group were scheduled for a study home visit; those in the control group were mailed the appropriate educational materials. Written informed consent was obtained as approved by the IRB during the in-home visit for subjects randomized to the treatment group and by mail for those randomized to the comparison group. Only those who provided written informed consent were considered enrolled in the study.

Figure 1. Study Design



Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Massachusetts Medical School.[43,44] REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources.

Determination of Clinically Important Medication Errors: To assess for the occurrence of clinically important medication errors, we employed methods that we had developed and tested in previous investigations relating to drug-related incidents in various settings and populations. We have assessed and published on the reliability and validity of the approaches that were employed.[8,29,45,46]

Definitions: The primary outcome of interest was "clinically important medication errors," a composite outcome composed of preventable or ameliorable ADEs and potential ADEs due to medication discrepancies or nonadherence. Secondary outcomes included (1) preventable or ameliorable ADEs; (2) potential ADEs due to discrepancies or nonadherence; and (3) preventable or ameliorable ADEs judged to be serious, life-threatening, or fatal. A "preventable" ADE is a drug-related injury relating to a medication error. Although some ADEs are not entirely preventable, their duration or severity could be reduced; such events have been characterized as "ameliorable" ADEs. Other types of medication-related problems, referred to as "potential" ADEs (PADEs), may present during the post-hospital discharge period. Though these situations may not yet have caused any injury to the patient, they have the potential to cause future harm if not addressed. The outcomes of interest were not limited just to the high-risk medications (anticoagulants, diabetes agents, and opioids) but included all medications.

Step 1 – Medical Record Review: Two dedicated and highly experienced pharmacist investigators (AOK and JLD) were responsible for reviewing the EHR of each patient following hospital discharge; these two pharmacists did not participate as clinical pharmacists in the intervention. We made every effort to blind the pharmacist investigators to the status of the patient with regard to randomization to the intervention or control arm. They reviewed electronic health records, including outpatient encounters, discharge summaries, emergency department visits, and laboratory results. A 45-day period post-hospitalization was reviewed. Each review followed a standardized procedure, searching for signals possibly indicating a clinically important medication error. Signals included new use of drugs that might be employed as antidotes to treat an ADE, laboratory abnormalities, the entering of a new drug allergy, short-term use of medications that are commonly prescribed for extended periods of time but that are not refilled after a first prescription, and specific diagnoses of adverse drug effects.

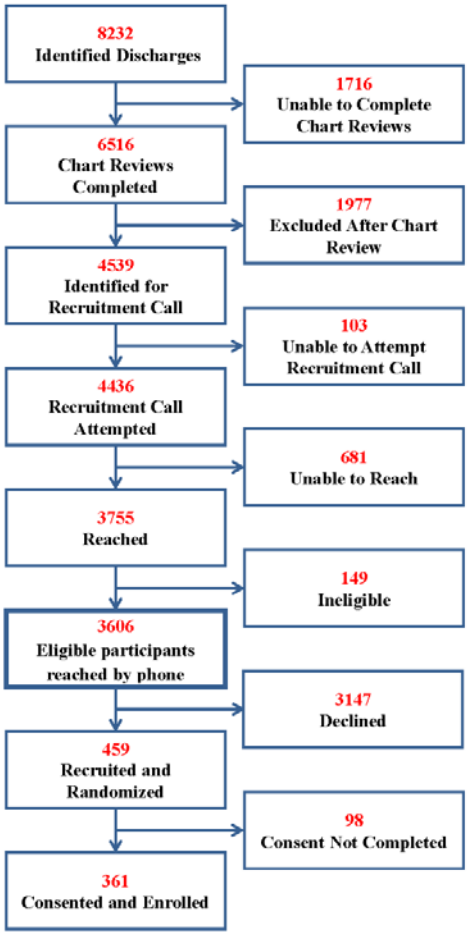
In addition, the pharmacist investigators reviewed information derived from a semistructured telephone interview conducted with the patient and/or caregiver between 5 and 6 weeks after hospital discharge. The telephone interview followed the approach used by Forster and colleagues[5] and assessed the patient's condition since hospital discharge by using a full review of organ systems, with special attention given to symptoms that may be relevant to medication(s) that the patient had been receiving. The patient was asked

about symptom severity, timing in relation to hospitalization and treatments, and resolution. The interview also assessed the patient's use of home care services, physician services, laboratory services, and hospital readmissions.

Step 2 – Event Identification: An event summary was prepared whenever the clinical pharmacist identified a possible clinically important medication error. The event summary incorporated data obtained from a comprehensive review, including medical and medication history, physical examination findings, laboratory data, and provider assessments. The event summary also captured information to assess the probability of an adverse event being attributable to the drug, including timing, severity, and resolution. This event summary information was presented to and reviewed independently by two blinded physician investigators (AK, SS, SLK, JHG) for final event determination.

Step 3 – Physician Adjudication, Independent Review: Two of the physician investigators independently reviewed the event summary information and classified the event as well as its severity and preventability. If there was disagreement, the two reviewers discussed the case to reach consensus. Consensus was reached in all cases. The physicians were blinded to the randomization status of the subject.

Figure 2. Process of Enrollment



AIM 2: RESULTS

Recruitment, Enrollment, and Consent: Figure 2 illustrates the process of enrollment, recruitment, and consent. In total, 8,232 individuals were identified as potentially eligible for the trial; after chart review by study staff, 4,539 were targeted for recruitment calls. Of the 3,755 reached by phone, 3,606 were determined to be eligible. Of these, 459 expressed interest and were randomized (230 intervention, 229 control); 361 individuals (180 intervention, 181 control) completed a consent form and were enrolled in the study. Thus, approximately 10% of those confirmed eligible were ultimately enrolled in the study.[47]

Reasons for Declining the Initial Invitation: Table 2 summarizes reasons for declining participation.[47] A total of 3,147 eligible participants declined the initial telephone invitation to participate in the trial. Of those that provided a reason beyond lack of interest, the most common reasons included being too busy to become involved in the trial or not feeling well enough (e.g., being too sick or too tired) to participate.

Table 2. Reasons for Declining Participation in the Clinical Trial[47]

Reasons for Declining	N	%
Total Sample	3,147	100
Not interested/no reason given	674	21
Feels they have all the information they need/instructions from hospital were clear	551	18
VNA/care from hospital	332	11
Doesn't feel study is useful	303	10
Caregiver/spouse takes care of meds	259	8
Too busy/not available	247	8
Been taking same medications for a long time	193	6
Too sick or too tired	187	6
On very few medications	138	4
Wanted information mailing only	89	3
Wants to speak with their healthcare provider	75	2
Does not want to take part in research, including have concerns about privacy	39	1
Has cognitive issues or is hearing impaired	17	1
Medications will be changing	11	<1
Will be rehospitalized	9	<1
Wanted pharmacist visit only	8	<1
Other	15	<1

Power and Sample Size: We had planned to recruit 500 subjects. We estimated an incidence rate of medication errors in the comparison group of 0.95. With 0.80 power, we would be able to detect a reduction of 19% (incidence rate ratio=0.81). As the study progressed, we encountered lower rates of recruitment than projected, with a final recruitment total of 361, enabling us to detect a reduction in the incidence rate of 22% (incidence rate ratio=0.78).

Data Analysis: To evaluate the impact of the multifaceted intervention on the incidence of clinically important medication errors, we estimated the average incidence rates of this composite outcome within each treatment group. Time denominators for the incidence rates took into account the number of days the participants were available for medical record review and the telephone interview during the 45 days after discharge, excluding days after a subject was rehospitalized, died, or disenrolled as a patient cared for by the medical group. Possible differences between the randomized intervention and comparison groups across patient characteristics, including demographic factors, comorbidity, prescribed medications, and aspects of the index hospitalization, were investigated using t-tests for continuous variables and chi-square tests for dichotomous and categorical variables. All analyses of outcomes were intention to treat. Analysis of the primary outcome is a direct comparison of the incidence rate ratios between the intervention and comparison groups. We also calculated the distribution of levels of severity and source of errors.

We achieved satisfactory balance of patient characteristics across arms (see **Table 3**); the only variable significantly different between treatment and comparison arms was having visiting nurse services. We performed multivariable analyses using Poisson binomial regression, taking into account the number of days each subject was followed and adjusting for age, sex, and having visiting nurse services. In exploratory analyses, we will examine possible effect modification by factors such as presence/absence of caregiver and visits by a home healthcare nurse.

Table 3. Characteristics of Enrolled Subjects

	Total Enrolled (N=361)		Intervention (N=180)		Control (N=181)		
DEMOGRAPHICS	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**p-value**
Age (Range 50-94)	68.73	9.34	69.44	9.40	68.03	9.26	0.15
DEMOGRAPHICS Cont.	**N**	**%**	**N**	**%**	**N**	**%**	**p-value**
Age, Categorical							0.31
50-54	22	6.09	9	5.00	13	7.18	
55-59	42	11.63	24	13.33	18	9.94	
60-64	56	15.51	22	12.22	34	18.78	
65-69	73	20.22	34	18.89	39	21.55	
70-74	63	17.45	33	18.33	30	16.57	
75-79	56	15.51	28	15.56	28	15.47	
80+	49	13.57	30	16.67	19	10.50	
Sex							0.10
Female	177	49.03	96	53.33	81	44.75	
Male	184	50.97	84	46.67	100	55.25	
SCREENING ITEMS	**N**	**%**	**N**	**%**	**N**	**%**	**p-value**
Prescribed >1 High-Risk Medication	195	54.02	97	53.89	98	54.14	0.96
High-Risk Medication							
Anticoagulant	184	50.97	98	54.44	86	47.51	0.19
Anti-Diabetic	135	37.40	71	39.44	64	35.36	0.42
Opioid	223	61.77	105	58.33	118	65.19	0.18
Taking ≥7 Medications of Any Kind	334	92.52	165	91.67	169	93.37	0.54
Proxy Listed in EHR	6	1.66	3	1.67	3	1.66	0.99
Has Caregiver	235	65.10	117	65.00	118	65.19	0.97
Proxy for Consent	29	8.03	17	9.44	12	6.63	0.33
Has Low Health Literacy	110	30.81	61	34.27	49	27.37	0.16
CLINICAL MEASURES	**N**	**%**	**N**	**%**	**N**	**%**	**p-value**
Has Visiting Nurse Services	187	51.80	99	55.00	88	48.62	0.00
Reason for Admission							0.63
Medical	198	54.85	104	57.78	94	51.93	
Surgical	88	24.38	43	23.89	45	24.86	

	Total Enrolled (N=361)		Intervention (N=180)		Control (N=181)		
Orthopedic	69	19.11	30	16.67	39	21.55	
Medical Procedure	6	1.66	3	1.67	3	1.66	
Admitted through ER	213	59.00	104	57.78	109	60.22	0.64
Comorbidity (categorical)							
0	44	12.19	27	15.00	17	9.39	0.24
1-2	103	28.53	48	26.67	55	30.39	
3+	214	59.28	105	58.33	109	60.22	
CLINICAL MEASURES (continuous)	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**p value**
Comorbidity (Range 0.00-14.00)	4.01	3.09	4.02	3.19	4.01	2.99	0.96
Length of Stay (Days) (Range 0.00 0-30.00)	2.73	2.61	2.59	2.24	2.87	2.94	0.31

Primary Trial Outcomes: The clinical pharmacist investigators identified a total of 192 possible drug-related incidents, of which 80% (154) were characterized as adverse drug events or potential adverse drug events by the physician reviewers. **Table 4** presents the primary trial outcome findings. The primary outcome of interest was clinically important medication errors, comprised of preventable or ameliorable ADEs and potential ADEs due to medication discrepancies or nonadherence. Secondary outcomes included (1) preventable or ameliorable ADEs; (2) potential ADEs due to discrepancies or nonadherence; and (3) preventable or ameliorable ADEs judged to be serious, life threatening, or fatal. The combined incidence rate of adverse drug events and potential adverse drug events in the intervention group was 1.1 per 1,000 person-days, and it was 1.0 per 1,000 person-days in the control group. The adjusted IRR of 0.968 (95% confidence interval .0.700,1.338) was not statistically significant. There was also not a significant impact of the intervention on the secondary outcomes of subcategories of events, as shown in the table.

Table 4. Primary Trial Outcomes

	Intervention Days of Follow-up 7,281		Control Days of Follow-up 7,275		IRR Unadjusted	IRR Adjusted	Confidence Intervals
Clinically Important Medication Errors	**#**	**IR**	**#**	**IR**			
All events	81	0.0111	73	0.0100	1.109	0.968	(0.700,1.338)
Preventable adverse drug events (ADEs)	39	0.0054	39	0.0054	0.999	0.840	(0.533,1.323)
Ameliorable ADEs	4	0.0005	6	0.0008	0.666	0.534	(0.148,1.924)
Potential ADEs	13	0.0018	10	0.0014	1.299	1.027	(0.442,2.387)
Serious, Life-Threatening, or Fatal Preventable or Ameliorable ADEs	46	0.0063	50	0.0069	0.919	0.767	(0.509,1.155)

Notes: Adjusted for age, sex and receiving services from the visiting nurse services
IR=Incidence Rate; IRR=Incidence Rate Ratio

Aim 3: To conduct a process evaluation assessing intervention fidelity, adaptation, mechanisms of impact, essential components, and the influence of contextual factors.

AIM 3: METHODS

As part of the process evaluation for this study, we conducted focus groups of patients and/or their caregivers who were invited to participate in the trial (both those who enrolled and those who declined to enroll). The purpose of the focus groups was to:

a) Gather information from patients/caregivers on their views about medications and medication safety.
b) Gather ideas from patients/caregivers about the best way to improve the study's intervention.
c) Understand the reasons that patients/caregivers decided to participate or not participate in the study and identify possible approaches to improving recruitment going forward.

Additionally, interviews were conducted with two clinical pharmacists who implemented the intervention in order to assess the intervention fidelity, adaptation of intervention processes or materials, and influence of other contextual factors. We also assessed their views on the essential intervention components.

Both the focus groups and pharmacist interviews were audio recorded and transcribed for analysis.

The intervention pharmacists also collected data related to the components of the intervention that were implemented.

AIM 3: RESULTS

Focus Group Results: The focus groups involved 27 participants, nine who enrolled in the trial, 15 who declined to participate in the trial, and three who were caregivers. Of the focus group participants, 17 were women, 11 were ≥65 years of age, 12 were 65-79 years of age, and four were ≥80 years of age. Five reported experiencing problems with medications within the past 3 months. Focus group participants' reasons for declining to participate in the trial are summarized in **Table 5**. Reasons for declining that were discussed during the focus groups generally corresponded to reasons expressed by those who declined over the telephone. One reason identified by focus group participants but not explicitly noted by those who declined the initial invitation was the timing of the invitation relative to leaving the hospital; focus group participants indicated that, if the request had come later, they may have been more likely to say yes (N=6). A second unique finding from the focus groups was that many participants worried about the authenticity of the invitation, suspecting that the call was a "scam" (N=6).[47]

The most commonly cited motivation for enrolling in the trial was that the study might result in benefits for the participant or others in the future (see also **Table 5**). One focus group participant stated, "I've got an appreciation for how important these kinds of studies are to help inform policy decision making in healthcare… You need to collect this information and understand what's happening with your patients so that you can make better decisions about how to serve them." Other reasons included the opportunity to voice their opinions, the benefit of "company" that a home visit would offer, and valuing research.[47]

Table 5. Summary of Reasons for Declining Participation

Reasons for Declining	**N**	**Quote**
Felt too sick, tired, or in pain	11	And I think I was just actually trying to blow you off. No. [Laughter] Because I felt so terrible. You know what I mean?
Timing/intervention is too soon after hospitalization	3	Usually within a few days when you come home from the hospital everything's in turmoil and you're not necessarily thinking straight. And you really haven't formed any sort of an opinion because it's just too soon. You haven't got back to normal. It's like maybe you should wait a little bit.
VNA/care from hospital	6	I had a visiting nurse, so why would I want someone else?
Have sufficient information	2	Yeah, oh, yeah. I'm pretty sure that's why. It was just more or less like, no, I'm okay, I know what I'm doing.
Been taking same medications for a long time	3	I mean if that was new medications right after you get out of the hospital, yes, but being on regular medications after surgery, immediately be on those meds right after surgery, right after you come home, and then I go back on my regular meds. When I went to the hospital this time I didn't have anything new.
Does not want to take part in research	1	I just think that right when you come home the furthest thing from your mind is do you want to be part of a research group. So I think that you would get more places if maybe you didn't use that term.
Other comments about not participating	1	I'm not really a phone person. I'm a face-to-face.
Concerned about a scam/fraudulent	6	That's the way of the world today. You don't know who's at the other end.
Reasons for Enrolling	**N**	**Quote**
Potential benefits (better care for others)	6	Like I said, too, before, if I get a call for a survey or for something like this, I'd go in a minute because I feel I'm paying back. I've been given so much that I'm starting to pay back.
Potential benefits (better care for self)	5	You can go back and say, this is what I learned here and I can now, if I have to do this again I've got … I know where the help is, I know how to get the help, I know how to do all that. Because the visiting nurse came in and said she was going to get me a visiting nurse and I never saw one. Nobody came to my house. Nobody called. Nothing. I was shocked. I thought, they set it all up in the hospital, I'm all set.
Wanted the company	1	What motivated me was I had just gotten out of the hospital with a life-changing situation and my medications, how are they going to affect me? What is going to be needed? And having a pharmacist come to the house, having someone to talk to at that particular moment, could have been a VNA, or whatever it is, anybody was just very calming to know that I'm on the right track with my medications. I don't see why anyone would say no. But then again… yeah … besides, it's company.

Reasons for Declining	N	Quote
Other comments about participating	2	I love to be part of it where my participation matters or it counts or my opinion, whatever.

Pharmacist Interviews: We interviewed two of the intervention pharmacists who combined conducted 152 (84%) of the intervention assessments.

Fidelity and Challenges: The intervention pharmacists reported that they were able to conduct the intervention visits as planned with minimal modifications or difficulties. However, they did report challenges, as described below.

The pharmacists reported that they were seldom able to conduct direct observations of administration of high-risk medications, because most patients took those medications very early in the morning, after dinner, or in the late evening. Instead, pharmacists asked patients to show them how they would take those medications. The pharmacists were able to observe administration of some other medications that were not high-risk medications.

The intervention pharmacists noted that there were times, though rare, when lack of resources (time, information, technology) limited their ability to fully implement the intervention as planned. For example, there were some occasions when documentation of all medication orders was not available. When they could not obtain additional medical record information, they proceeded with the intervention based on what the prescription bottle read and noted that in their intervention summaries to the primary care team (and, if it seemed an urgent issue, they contacted the primary care team immediately). At other times, the patient did not have access to all of their prescription or over-the-counter medications, as they were discharged on the same day of the intervention visit and had not yet picked up their new prescriptions or were staying at their caregiver's home and did not have all of their medications on the premises yet. Lack of time to fully complete the intervention visit (on the patient's part) and lack of internet connectivity occurred on occasion.

Conducting home visits during off hours also created some communication challenges. We offered to have the home visit occur at the most convenient time for the patient/caregiver, with the result that some intervention visits occurred in the evening or over the weekend. In these cases, if the intervention pharmacist found an urgent issue, they then had to call and speak with a covering physician who was not always the patient's primary care provider.

Essential Parts of the Intervention: Both pharmacists agreed that the most critical part of the intervention was the medication reconciliation. The most important part of this process was being able to see all of the medications at hand in the home (both prescription, and over the counter). In fact, medication discrepancies were the most common issues identified. Many of the patients in the intervention group requested that the clinical pharmacists provide an updated medication list to them at the close of their home visit (due to the number of medication discrepancies identified). The pharmacists did not do this, as this was beyond the scope of their role in this study (the primary care providers were responsible for prescribing decisions). Patients were directed to obtain updated medication lists from their primary care providers; the medication discrepancies were communicated to the primary care team by the pharmacists as part of the intervention.

Though the pharmacists agreed that an adaptation of the intervention to allow "visits" to occur by phone would allow the pharmacist to provide consultation, phone consultations would preclude visual inspection of the patient's medications and observation of administration, both important aspects of the intervention.

Communication via the electronic medical record was seen as another essential piece of the intervention. This allowed sharing clinical information with the primary care team in a secure, immediate, and seamless fashion with ease.

Both pharmacists noted that they did not believe many patients would fully read the written materials provided but emphasized that, during the intervention visit, they reviewed each of the medication handouts and highlighted the most critical pieces of information with the patient. They were also able to reinforce that information again during their follow-up phone calls.

Influence of Contextual Factors: Both pharmacists identified in-home support as the contextual factor that was most influential. Specifically, they noted that patients without strong in-home support from family members or

other caregivers appeared to benefit more from the intervention compared with those who did have strong support at home.

Details of the Intervention and Intervention Fidelity: The intervention developed was composed of the four key components below, and the fidelity of each component as well as some additional details are described.

Component 1 – Pharmacist In-Home Visit: Of the 180 intervention participants, 178 received an in-home visit by a clinical pharmacist to implement the intervention; the remaining two intervention participants had an assessment completed via telephone (at the request of the participant). The average time it took to conduct an in-home visit was 83 minutes. The average time the clinical pharmacist spent per intervention participant (which includes preparation for the in-home visit, travel, and consultation time) was 3.8 hours.

One intervention participant was not actively taking any medications from the identified high-risk medication classes when the pharmacist attended the in-home visit. The remaining 179 intervention participants were taking medications in the identified high-risk medication categories, as follows (not mutually exclusive): antidiabetic agents (n=72, 40.2%), anticoagulants (n=97, 54.2%), and opioids (n=104, 58.1%).

The clinical pharmacists identified 368 total medication issues for 173 (96%) of the 180 intervention assessments (see **Table 6** for types of medication issues identified).

Table 6. Issues Identified by Clinical Pharmacist During Intervention Assessments

Issue Identified	Intervention Group		Of the Total Issues Identified	
	N	%	N	%
Total Sample Size	**180**	**100.0**	**368**	**100.0**
Identified Any Medication Issue in Category	173	96.1	368	100.0
Medication Discrepancies	170	94.4	170	46.2
Clinically Significant Interactions and High-Risk Medication Combinations	113	62.8	113	30.7
Complaints or Potential Side Effects	45	25.0	45	12.2
Medication Administration	7	3.9	7	1.9
Medication Organization	6	3.3	6	1.6
Medication Storage	9	5.0	9	2.4
Medication Disposal	15	8.3	15	4.1
Understanding	3	1.7	3	0.8

Component 2 – Use of Educational Tools Specifically Targeted to High-Risk Patients and Caregivers: All study participants received medication information packets (control group participants were mailed packets). Of the 180 intervention participants, 178 received and reviewed the informational packets during their in-home visit; the remaining two were mailed informational packets at the completion of their telephone-delivered intervention. **Table 7** details the types of information provided to study participants in the informational packets. On an as-needed basis (nine of the 361 medication packets distributed), the pharmacists created educational materials for other high-risk drugs that had not been developed as part of the study materials. They used the same sources of information and layout to create these as-needed materials as was used to develop all the other drug information handouts.

Table 7. Medication Information Packets Provided to Study Participants

Medication/Information	Total Enrolled N=361		Intervention N=180		Control N=181	
	N	%	N	%	N	%
General Medication Information						
Medication Safety Tips	345	95.6	171	95.0	174	96.1
Anti-Diabetics						
Anti-Diabetic Facts	137	38.0	72	40.0	65	35.9
Albiglutide	0	0.0	0	0.0	0	0.0
Canagliflozin	2	0.6	0	0.0	2	1.1
Dapagliflozin	0	0.0	0	0.0	0	0.0
Dulaglutide	6	1.7	3	1.7	3	1.7
Glimepiride	4	1.1	3	1.7	1	0.6
Glipizide	34	9.4	17	9.4	17	9.4
Glyburide	7	1.9	2	1.1	5	2.8

Medication/Information	Total Enrolled N=361		Intervention N=180		Control N=181	
	N	%	N	%	N	%
Insulin	62	17.2	31	17.2	31	17.1
Liraglutide	4	1.1	0	0.0	4	2.2
Metformin	76	21.1	42	23.3	34	18.8
Pioglitazone	2	0.6	2	1.1	0	0.0
Saxagliptin	0	0.0	0	0.0	0	0.0
Sitagliptin	3	0.8	2	1.1	1	0.6
Anticoagulants						
Anticoagulant Facts	181	50.1	96	53.3	85	47.0
Apixaban	24	6.6	13	7.2	11	6.1
Dabigatran	1	0.3	1	0.6	0	0.0
Enoxaparin	70	19.4	34	18.9	36	19.9
Fondaparinux	1	0.3	1	0.6	0	0.0
Rivaroxaban	9	2.5	5	2.8	4	2.2
Warfarin	94	26.0	51	28.3	43	23.8
Opioids						
Opioid Facts	216	59.8	101	56.1	115	63.5
Codeine/Acetaminophen	3	0.8	1	0.6	2	1.1
Fentanyl	3	0.8	2	1.1	1	0.6
Hydrocodone/Acetaminophen	16	4.4	9	5.0	7	3.9
Hydromorphone	8	2.2	3	1.7	5	2.8
Morphine	8	2.2	3	1.7	5	2.8
Oxycodone	125	34.6	60	33.3	65	35.9
Oxycodone/Acetaminophen	20	5.5	11	6.1	9	5.0
Tramadol	43	11.9	22	12.2	21	11.6
Other	9	2.5	5	2.8	4	2.2

Component 3 – Communication with the Primary Care Team via the EHR: All 180 intervention participants had an electronic note sent to the primary care team via the EHR. Pharmacists placed phone calls to a primary care team member during the intervention visit due to an urgent matter for 88 (48%) of the intervention participants.

Component 4 – Follow-Up Phone Call to Patient/Caregiver by Pharmacist: Follow-up phone calls were attempted to 179 intervention participants; 1one participant had been admitted to a short-term rehab, so a call was not attempted. Of the 179 people who were attempted to be reached, 152 (84% of the intervention group) follow-up phone calls were conducted. Of the 152 completed follow-up calls, 99 were completed within the 14-day follow-up period (53 calls were “completed” beyond the 14-day follow-up period, but attempts to reach the patient began within the follow-up timeframe). Follow-up calls were conducted mainly directly with the patients (96.1%; 146/152) and less often with proxies or caregivers (3.9%, 6/152; and 2.0%, 3/152, respectively). The average follow-up phone call lasted 10.8 minutes (range 2-45 minutes; median 9.5 minutes). Seventeen percent (25/152) of patients reached reported having a problem with their medication since the intervention visit. Eleven percent (16/152) had some follow-up questions about their medications. New medication safety issues were identified in 30.9% (47/152) of the completed calls. An additional communication to the primary care team occurred for 28.9% (44/152) of those reached.

Aim 4: To create (1) a plan for disseminating study findings to stakeholders who might implement the intervention or make decisions about its future use and (2) an implementation toolkit for those who wish to implement the intervention in practice.

AIM 4: METHODS

Findings are planned to be disseminated in a number of ways: presentations at national research meetings and publications in peer-reviewed journals. Additionally, the study team will present findings to local stakeholders (e.g., leadership at study sites). Materials used by the intervention pharmacists have been compiled into a toolkit available for public use (see Products section).

AIM 4: RESULTS

Materials used by the intervention pharmacists have been compiled into a toolkit available for public use. See the Products section for a description of the toolkit contents.

The toolkit will be made available on the Meyers Primary Care Institute’s website. Our plans are to disseminate research findings through presentations at national meetings including the annual scientific meetings of the

Gerontological Society of America (GSA) and the American Geriatrics Society. We will also disseminate study findings via the Health Care Systems Research Network-Older American Independence Centers (HCSRN-OAICs) AGING Initiative, a national research collaboration of healthcare delivery system researchers embedded in healthcare systems who work together with university-based aging researchers based at institutions with Pepper Centers. Dr. Gurwitz serves as PI of the HCSRN-OAICs AGING Initiative. Presentations and publications related to the main study findings will direct those interested to the toolkit.

CONCLUSION/DISCUSSION

The study team was successful in developing a multifaceted intervention for older adults recently discharged from the hospital who were prescribed at discharge one or more of the three high-priority, high-risk drug classes (anticoagulants, diabetes agents, and opioids). The materials utilized by the clinical pharmacists for the intervention have been compiled into a toolkit that will be made publicly available.

Despite recruitment challenges, we successfully enrolled 361 patients into the randomized, controlled trial of the multifaceted intervention; 180 were randomly assigned to the intervention group, and 181 were randomly assigned to the control group.

Medication reconciliation and the ability to see firsthand all the patient's medications (both prescription and over the counter) were seen as the most critical components of the intervention by the clinical pharmacists. Medication discrepancies were the most common issues identified by the clinical pharmacists in carrying out the intervention.

We found that clinically important medication errors were common during the immediate post-hospitalization period among study subjects. More than three quarters of the events led to multiple symptomatic days, adding to the problems involved in recovering from hospitalization. However, our intervention, hinging on home visits by clinical pharmacists, did not lower the incidence rate of events. The frequency of such events and their impact on patients during a critical period suggest a need for additional research and the development, testing, and adoption of more effective approaches for preventing these important events.

LIST OF PUBLICATIONS AND PRODUCTS

Publications:

None.

Products:

Toolkit: Table of Contents

- **Clinical Pharmacist Training Materials:**
  - Interview Process: Mock Case and Case Worksheet
  - Training Agenda
  - Training PowerPoint
- **Clinical Pharmacist Reference Materials:**
  - Intervention Reference Manual
  - Medications List (generic, brand, indication)
- **Home Visit Intervention Materials:**
  - Home Visit Checklist
  - Home Visit Worksheet
  - Medication Reconciliation Table
  - Educational Materials for Patients:
    - General Medication Information
      - Medication Safety Tips
    - Antidiabetics
      - Anti-Diabetic Facts
      - Albiglutide
      - Canagliflozin
      - Dapagliflozin
      - Dulaglutide
      - Glimepiride
      - Glipizide
      - Glyburide
      - Insulin

- Liraglutide
- Metformin
- Pioglitazone
- Saxagliptin
- Sitagliptin

Anticoagulants

- Anticoagulant Facts
- Apixaban
- Dabigatran
- Enoxaparin
- Fondaparinux
- Rivaroxaban
- Warfarin

Opioids

- Opioid Facts
- Codeine/Acetaminophen
- Fentanyl
- Hydrocodone/Acetaminophen
- Hydromorphone
- Morphine
- Oxycodone
- Oxycodone/Acetaminophen
- Tramadol

Template for Electronic Medical Record Communication

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