Original Work

Evaluation of Post-Hospitalization Medication Recommendation Acceptance Rates in a Primary Care Setting

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Abstract

Objective: To determine the types of pharmacist recommendations made and subsequently accepted by providers in the SmartMeds transitions of care program.

Setting: Primary care clinic setting within an academic medical center.

Practice Innovation: SmartMeds is a pharmacist-led transitions of care program that was established to increase medication safety in recently hospitalized adults over the age of 60. Eligible patients met with a primary care clinical pharmacist either in clinic or via phone prior to their provider hospital follow-up appointment to identify medication issues.

Program Evaluation: A retrospective chart review was conducted to assess types of interventions recommended by the pharmacists, and of those, which were accepted by the provider. The number of orders that the pharmacist prepared in the electronic health record for the provider to sign was also assessed. Lastly, a patient satisfaction survey was conducted.

Results: There were 104 patients enrolled in the program from April 2017 to August 2018. The pharmacist recommended a total of 252 medication-related changes or interventions. The provider acceptance rate for medication-specific changes or monitoring was 62.9%, and the overall provider acceptance rate of all pharmacist-led interventions was 83.7%. Ordering lab(s) was the most common recommendation, with a provider acceptance rate of 66.7%. Eleven of the medication recommendations were prepared by the pharmacist for the provider to sign, and all those recommendations were accepted by the provider. Of the patients that completed the survey, 90% rated the overall care received by the pharmacist as good, very good, or excellent.

Conclusion: While many pharmacist-led recommendations did not require explicit acceptance from the provider, most recommendations that did require approval were accepted. The most frequent recommendation was ordering lab(s) for patients. Additional research is needed to assess factors that lead to providers choosing not to accept a recommendation and to determine the clinical impact of the SmartMeds program.

Keywords: transitions of care, comprehensive medication review, provider acceptance, ambulatory care, older adults, pharmacist recommendations

Communication barriers can lead to inadequate transitions of care (TOC) when patients move from the inpatient to outpatient setting.[1] When there are communication breakdowns between different members of the healthcare team, patients do not receive a clear message about which care plan to follow at discharge. These inadequacies can cause confusion and potentially contribute toward readmissions, which are costly. In 2013, the Agency for Healthcare Research and Quality (AHRQ) reported an average total cost of $13,800 per 30-day readmission for Medicare recipients, with an all-cause readmission rate of 16.2%.[2]

Programs in TOC have been established to ameliorate these problems and have included services such as telehealth appointments to telephone follow-up calls.[3,4] These services are highly variable and are led by different members of the health care team. Pharmacists are uniquely positioned to take the lead in these programs as studies have shown that medication errors occur in 88% of cases on admission and 42-100% of cases upon discharge.[5] TOC programs take place in community settings, payer settings, health care system or clinic settings.[5] The goals across these TOC settings may be similar; however, the lack of integration into the health system in the community and payer settings can cause difficulty when attempting to assess a patient holistically or communicate with providers.[6,7]

The lack of integration into the health system decreases direct communication with providers and can lead to decreased medication recommendation acceptance rates. This was demonstrated by a 2011 study that used pharmacists in a payer setting to deliver Medication Therapy

Management (MTM) services.[7] The acceptance rate of recommendations made to providers was only 47%, but pharmacists were limited by not having access to the patients' medical records and by only delivering recommendations via fax. Another study in a community setting found a 30.5% acceptance rate for recommending statins for patients with diabetes.[8] TOC programs can be limited by the same challenges in the community setting, with limited access to detailed medical records such as the course of the hospitalization or pertinent laboratory values.[9]

There is currently limited research regarding pharmacists working in transitions of care within health systems. One study examined hospital readmissions rates and types of recommendations made to providers within a single academic health system.[10] Although 96% of pharmacists' recommendations were accepted by the patient, only 50% of recommendations were accepted by providers. The specific types of recommendations that were more likely to be accepted or denied by the provider or patient were not discussed.

Given the lack of information on the types of recommendations likely to be accepted by providers in a TOC program within an academic health system, the SmartMeds program aimed to assess this. The SmartMeds program is a primary care clinical pharmacist (PCCP) TOC program embedded within a single academic medical center. Following discharge, eligible patients receive an appointment with the PCCP to receive a comprehensive medication review (CMR) either in person or via phone, and recommendations are made to the provider. Acceptance rates of these recommendations may guide the PCCPs in deciding which disease states to focus on during their CMR. This could lead to more targeted and, ultimately, more successful TOC interventions.

Objective

To determine the types of pharmacist recommendations made and accepted by providers in the SmartMeds TOC program.

Setting

The SmartMeds Program is embedded in the primary care setting of UW Health, a large academic medical center. UW Health currently has over 30 primary care clinics, with 9 participating in this program.

As of 2018, there were 5 PCCPs working in these clinics. All were board-certified ambulatory care pharmacy pharmacists and responsibilities outside SmartMeds included cardiovascular health (hypertension medication titration and statin initiation), clinical consult services, and general follow-up with patients via phone calls. The hospital follow-up CMRs for the SmartMeds program accounted for approximately 6% of the pharmacists' workload based upon information from the program workload dashboard. The PCCPs were split between the 9 clinics in addition to an offsite phone-based location. Due to the limited number of pharmacists in this setting, none of the clinics had pharmacist coverage 100% of the time. Three pharmacy interns used the Electronic Health Record (EHR) to search for eligible patients and all PCCPs used the EHR to document CMRs and other patient care activities.

Pharmacists are currently one component of the TOC team. Other caregivers involved include primary care nurses, nurse care coordinators, and inpatient transitional care nurses, but their focus is on scheduling follow-up appointments and screening for red-flag symptoms. The SmartMeds program aimed to better streamline the TOC process to make sure pharmacists were involved in post-hospitalization medication reviews for older adults.

TABLE 1. Patient baseline demographics (n = 104)

Baseline Demographics	
Male, n (%)	52 (50.0)
Age, years (mean ± SD)	73.1 (8.9)
Race, n (%) White African American	 101 (97.1) 3 (2.9)
Charlson Comorbidity Index (mean ± SD)	5.04 (2.2)
Diagnoses, n (%)	
Congestive Heart Failure Diabetes Mellitus Malignancy Asthma Chronic Obstructive Pulmonary Disease Chronic Kidney Disease Atrial Fibrillation Myocardial Infarction	24 (23.1) 32 (30.8) 17 (16.3) 17 (16.3) 16 (15.4) 25 (24.0) 31 (29.8) 22 (21.2)

Practice Innovation

In January of 2017, the UW Health Pharmacy Services Department collaborated with the United Way of Dane County, UW-Madison School of Pharmacy, and the Pharmacy Society of Wisconsin to launch SmartMeds, a program focused on increasing medication safety for recently hospitalized adults over the age of 60. The age range was set by United Way, with the goal of including a large subset of older adults who are more likely to have chronic conditions and a higher medication burden. The goals of the program were to increase patient adherence to complex medication regimens, reduce unplanned hospitalizations and falls, and reduce the risk of adverse drug events (ADEs). The program utilizes pharmacists either via a face-to-face appointment in clinic or via telephone from a remote site to speak with a patient post-hospitalization to perform a CMR.[9]

Patients were identified by pharmacy interns as candidates for the intervention based on the following inclusion criteria: 1) at least 60 years of age, 2) scheduled for hospital follow-up clinic visit after hospital discharge, 3) discharged home or to an assisted living facility and 4) not followed

TABLE 2. Medications Intervention Acceptance Rates Based on Type of Intervention

Interventions Requiring Provider Approval (N=105)				
	Accepted N (%)	***Denied N (%)***	***Delayed N (%)***	***Not Addressed N (%)***
Med Initiation	14 (73.7)	3 (15.8)	2 (10.5)	0 (0)
Med Discontinuation	7 (58.3)	3 (25)	1 (8.3)	1 (8.3)
Dose or Duration Change	12 (66.7)	2 (11.1)	0 (0)	4 (22.2)
Therapeutic Interchange	5 (62.5)	1 (12.5)	1 (12.5)	1 (12.5)
Dose Consolidation	1 (100)	0 (0)	0 (0)	0 (0)
Monitoring **Labs** **Vaccines**	24 (66.7) 3 (27.3)	1 (2.7) 1 (9.1)	3 (8.3) 1 (9.1)	8 (22.2) 6 (54.5)
Overall Acceptance for Interventions Requiring Provider Approval, N (%)	**66 (62.9)**			
Interventions Not Requiring Provider Approval (N=147)				
	Accepted N (%)	***Denied N (%)***	***Delayed N (%)***	***Not Addressed N (%)***
Focused Adherence*	30 (100)	0 (0)	0 (0)	(0)
Medication Device Instruction or Education	4 (80)	0 (0)	0 (0)	1 (20)
Care Coordination†	111 (99.1)	0 (0)	0 (0)	1 (0.9)
Total Acceptance for Interventions not Requiring Provider Approval, N (%)	145 (98.6)			
Overall Acceptance for All Interventions (N=252), N (%)	***211 (83.7)***			

** Focused adherence included referral to medication box packaging, referral to the mail order pharmacy, referral to get medication refills synchronized, sending refills to the pharmacy, or other adherence strategies as determined by the pharmacist*
† Care Coordination included medication clarifications, appointment scheduling, care team referrals, and medication reconciliations

by another transitions of care team. The patient must also have at least one of the following: 1) medication changes to high risk medications (e.g. warfarin, low molecular weight heparins, direct oral anticoagulants, or dual antiplatelet therapy) or maintenance medications related to chronic disease state (e.g. asthma, chronic obstructive pulmonary disease, heart failure, or chronic kidney disease) made during hospitalization OR 2) admitted due to falls, exacerbation, or diagnosis of a chronic disease, OR 3) concerns about medication adherence, noticeable knowledge barriers, or concerns about device technique. The following patients were excluded from the program: seen only in emergency department or urgent care, discharged from oncology, bone marrow transplant, or transplant service, discharged to a skilled nursing facility or long-term care facility, home health nursing assistance at discharge, or patient of palliative care.

The candidate list was sent to the PCCPs weekly to identify patients eligible for the intervention. The PCCPs confirmed eligibility as workflow allowed, and those patients received a CMR either face-to-face during their hospital follow-up appointment or via telephone. If completed face-to-face, the PCCP would talk with the patient prior to the provider. If completed via telephone, the PCCP would call the patient prior to the patient's hospital follow-up appointment. During the visit or phone call, they would review changes that were made post-hospitalization with the patient, assess any problems with the changes, and assess whether additional changes were warranted. Occasionally the PCCP would prepare a prescription for the provider to review and sign. The visit or phone call was documented in a progress note and routed to the provider through the EHR. It was then up to the provider to review the PCCP's note and choose whether to implement the recommended changes during the hospital follow-up appointment.

Program Evaluation

A retrospective chart review was conducted to assess types of interventions recommended by the PCCP and, of those, which were accepted and implemented by the provider. Intervention types included medication initiations and

TABLE 3. Medication Intervention Acceptance Rates Based on Disease State

*Medication Category**	*Total N (%)*	*Accepted N (%)*	*Denied, Delayed, or Not Addressed N (%)*
Cardiovascular	22 (38.6)	14 (63.6)	8 (36.4)
Mood and Sleep	4 (7.0)	4 (100)	0 (0)
Pain	5 (8.8)	5 (100)	0 (0)
Gastroesophageal Reflux Disease (GERD)	5 (8.8)	3 (60.0)	2 (40.0)
Asthma/Chronic Obstructive Pulmonary Disease (COPD)	5 (8.8)	3 (60)	2 (40)
Diabetes	4 (7.0)	1 (25)	3 (75)
Over-the-counter	4 (7.0)	2 (50)	2 (50)
Other	8 (14.0)	6 (75)	2 (25)
Total	**57 (100)**	**38 (66.7)**	**19 (33.3)**

**Only includes the medication initiations, discontinuations, dose or duration changes, and therapeutic interchanges.*

discontinuations, dose or duration changes, therapeutic interchanges, dose consolidations, monitoring (i.e. labs and vaccines), focused adherence, medication device instruction or education, and care coordination (i.e. medication clarifications, appointment scheduling, care team referrals, and medication reconciliations). Data were further evaluated to determine acceptance based on disease state (e.g. cardiovascular, diabetes). Additionally, the percentage and acceptance rate of orders that the PCCP prepared in the EHR for the provider to sign was collected. Baseline demographics and the Charlson Comorbidity Index[12] were also collected.

To assess patient satisfaction with SmartMeds, patients received a follow-up phone call survey from a pharmacy intern one to two weeks after the CMR with the PCCP. Patients were called a total of 3 times before being considered lost to follow-up. The survey included 6 questions related to their satisfaction with the program using a 5-point scale of 1 (poor) to 5 (excellent).

Descriptive statistics were used to characterize acceptance rates and satisfaction scores. This project was determined not to meet the federal definition of research and the UW-Madison Health Sciences Institutional Review Board certified it as a quality improvement project.

Results

From April 2017 to August 2018, 104 patients received the service. The population was older (average age of 73.1), 97% Caucasian and had an average Charlson Comorbidity Index of 5.04, which is a rating of "severe" and predicts an 85% mortality rate after one year (Table 1).[12]

There were a total of 252 medication recommendations made by the pharmacists. The acceptance rate for medication-specific changes or monitoring (i.e. labs and vaccines) was 62.9% (Table 2). These changes required the provider to review the PCCP's recommendations and implement the change for the patient. The most common recommendation was ordering lab(s) for a patient, which had a 66.7% acceptance rate, followed by medication initiations, which had a 73.7% acceptance rate.

The overall provider acceptance rate for medication-specific changes, monitoring, or other medication-related interventions (e.g. adherence, medication reconciliation) was 83.7%. This percentage includes interventions that had to be implemented by the provider in addition to interventions that did not need explicit provider acceptance. Of the 252 recommendations, only 11 (4.4%) were denied, and 30 (11.9%) were delayed or not addressed during the visit.

The medication initiations, discontinuations, dose or duration changes, therapeutic interchanges, and dose consolidations were further examined based on disease state. Table 3 characterizes acceptance based on these disease states. The most common medications indicated were in the cardiovascular category, which included hypertension medications, statins, and anticoagulants.

For all medication changes, there were 65 opportunities where the medication order could have been prepared by the pharmacists in the EHR for the provider to review and sign. Of these, 11 of the orders were prepared in the EHR by the pharmacist. All 11 changes were signed and accepted by the provider.

Satisfaction surveys were completed by telephone with 40 (38.5%) SmartMeds patients (Table 4). The other patients were lost to follow-up due to an inability to reach them. The patients gave a rating of "good", "very good", or "excellent" 90% of the time for the question regarding the overall care they received from the pharmacist. For all survey questions, 98.5% of the responses fell under the "good", "very good", or "excellent" category.

Discussion

The SmartMeds program had acceptance rates of 83.7% for all recommendations and 62.9% for

TABLE 4. Patient Satisfaction Telephone Survey (n=40)

*Medication Category**	*Poor N (%)*	*Fair N (%)*	*Good N (%)*	*Very Good N (%)*	*Excellent N (%)*	*N/A N (%)*
How would you rate your satisfaction with the pharmacist ability to answer your questions about your medicine?	0 (0)	1 (2.5)	7 (17.5)	15 (37.5)	12 (30.0)	5 (12.5)
How would you rate your satisfaction with the pharmacist's ability to provide you with information about your medicines?	0 (0)	0 (0)	8 (20.0)	11 (27.5)	14 (35.0)	7 (17.5)
How would you rate your satisfaction with the pharmacist helping you to understand the purpose of your medicines?	0 (0)	2 (5.0)	6 (15.0)	15 (37.5)	11 (27.5)	6 (15.0)
How would you rate your satisfaction with the pharmacist helping you to understand how to take your medicines to prevent problems?	0 (0)	0 (0)	10 (25.0)	12 (30.0)	13 (32.5)	5 (12.5)
How would you rate the pharmacist's ability to be clear when explaining suggested changes to your medicines?	0 (0)	0 (0)	9 (22.5)	10 (25.0)	10 (25.0)	11 (27.5)
How would you rate the overall care you received from the pharmacist?	0 (0)	0 (0)	8 (20.0)	12 (30.0)	16 (40.0)	4 (10.0)

recommendations that had to be accepted by the provider. Most of the recommendations made that had to be explicitly accepted by the provider were monitoring-related, which included orders for both labs and vaccines. It is also notable that of the recommendations not accepted, the majority were delayed or not addressed rather than explicitly denied. This suggests that not accepting a pharmacist-led recommendation may be due to other factors (e.g. lack of provider time, higher priority concerns) rather than disagreement with the pharmacist. This contrasts with previous studies in the community setting demonstrating physician acceptance rates of pharmacists' recommendations ranging from 10% to 60%.[13] This evaluation of the SmartMeds program further demonstrates the importance of pharmacists working closely with providers to improve patient care.

Previous studies have also analyzed pharmacist recommendation acceptance rates across disease states. Doellerner and colleagues investigated the appropriate use of high risk medications in elderly patients and the use of statins in patients with diabetes for primary prevention.[8] They found 58.9% of high risk medication recommendations were accepted and 19.7% of statin recommendations were accepted.[5] Comparatively, this evaluation of the SmartMeds program found that the majority of medication recommendations were in the cardiovascular category, with 63.6% of recommendations accepted.

Although only 11 medication recommendations were prepared as an order for the provider to sign, it is notable that 100% of these orders were accepted. Anecdotally, the PCCPs noted that preparing the order tended to occur when they were in close physical proximity to the provider and were able to communicate with them in person. This may be why only 11 of the 65 eligible recommendations were prepared for the provider in advance. Direct communication has been shown to be a mutual goal between physicians and pharmacists[14], so leveraging this goal could lead to increased communication and improved medication use. Additionally, studies have described that using technology to communicate with providers from different geographic locations has proved difficult and has led to poorer communication.[14,15] By placing pharmacists among providers in a shared clinic setting communication is streamlined.

Patient satisfaction is also an important aspect of program success. A randomized trial by Dukas and colleagues showed that patients who received a pharmacist phone call after hospitalization were more likely to be satisfied with discharge medication instructions than those that did not receive a phone call (86% satisfaction versus 61% satisfaction).[16] The SmartMeds program was also highly regarded by patients with 98.5% of all survey responses falling under the "good", "very good", or "excellent" category. One patient stated, "This was the first time I received a phone call from a pharmacist, and she made me feel comfortable asking any questions, which she answered thoroughly."[11]

There are several limitations to this evaluation. Although the SmartMeds program included 104 patients over 16 months, it is difficult to make conclusions about which type of medication recommendations made were more likely to be accepted or denied. This is because most interventions did not have to be explicitly accepted by the provider. These interventions included adherence, coordinating care (including medication reconciliation), and further instruction about medication devices. To better understand if certain recommendations are more likely or less likely to be accepted, further data collection and analysis are warranted. Streamlined communication through the electronic health record was a benefit of this program, but many of the CMRs were completed over the phone at an offsite location. This led to fewer opportunities to work face-to-face with the provider, which might have limited the potential acceptance rate of PCCP recommendations. As the program expands and pharmacists are further implemented in the clinic, there will be more opportunities for provider interaction.

In the future, a comparison of outcomes (i.e. rehospitalization rate) for those who did or did not receive the CMR intervention could assess the impact the recommendations made. Further research is also needed to determine whether provider acceptance was affected by physical location of the pharmacist (i.e. directly in clinic or at a remote site) and to assess

providers' attitude towards the program. In addition, the PCCPs only spent 6% of their workload completing CMRs within SmartMeds. In the future, the program could be expanded to include those who discharged from the emergency room or to long term care facilities. The types of interventions made by PCCPs for patients discharging from or to different sites of care may change, but this could increase access to pharmacist services while simultaneously expanding the program. Additionally, an analysis of how other institutions bill for similar services could provide guidance on reimbursement.

Conclusion

The SmartMeds program expanded the role of the PCCPs within a clinic setting while maintaining high patient satisfaction. The types of recommendations made varied widely, with most medication recommendations requiring provider approval falling under the cardiovascular category. This analysis demonstrated that most medication recommendations were accepted, potentially due to the location in an academic medical center where both providers and pharmacists utilized the EHR for patient care documentation.

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