

Implementation of a Pharmacist-Optimized Education and Transition (POET) Service Advances Pharmacy Practice at a Community Teaching Hospital

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Transition of care services led by pharmacists at discharge can decrease 30-day readmission rates, improve patient safety, and reduce costs.¹⁻³ The “PMIT” (pharmacist-provided medication management in interdisciplinary transitions in a community hospital) study demonstrated benefit for patients and financial favorability for the hospital when transitions of care pharmacists were embedded into an interdisciplinary team.¹ This study reported an 11% absolute reduction and a 50.2% relative reduction in 30-day readmission rates when transition services are performed by a pharmacist. It concluded that for every dollar spent on a pharmacist’s time, twelve dollars were saved. Zemaitis et al compared pharmacist-led services to a historical control and found a 27% reduction in the 30-day readmission rate.² Pharmacists made 546 medication interventions in 690 patients over one year. Additionally, a meta-analysis including 17 studies and 21,342 patients found a 67% reduction in adverse drug related events leading to hospital readmissions, a 28% reduction in emergency department (ED) visits, and a 19% reduction in hospital readmissions when comparing pharmacist conducted medication reconciliation to usual care.³ National pharmacy organizations have outlined transition of care best practices and identified opportunities for pharmacist participation.^{4,5}

St. Elizabeth Youngstown Hospital (Youngstown, Ohio) is a member of Bon Secours Mercy Health, one of the largest Catholic health care systems in the

Abstract

Objective: The purpose of this quality improvement project was to implement and evaluate a pharmacist-led education and transition of care service at discharge.

Method: Pharmacists performed the following core activities for patients with a planned discharge to home on one intermediate telemetry unit: reviewing discharge medication reconciliation, correcting the home and discharge medication lists, identifying and resolving drug therapy problems, and providing patient education on medication changes. A retrospective chart review was conducted post-discharge to evaluate the effect of the service during a pilot period (December 2016 to June 2017) on the following: pharmacist identification and correction of medication reconciliation discrepancies and drug therapy problems, hospital readmissions and emergency department visits at 30 days post-discharge, and patient satisfaction scores on the nursing unit. A second follow-up retrospective chart review was later conducted on patients who received the pharmacist-led services from May to October 2018.

Results: During the pilot period, pharmacists identified 336 unintentional discrepancies on discharge medication reconciliation and solved 392 drug therapy problems. The 30-day readmission rate was reduced by 26.4% and the 30-day emergency department visitation rate was decreased by 71%. Hospital Consumer Assessment of Healthcare Providers and Systems survey scores improved during the pilot period by an average of 14% for related categories. A follow-up retrospective chart review of the service demonstrated that 30-day readmissions were further reduced by 28.2% over the pilot program period.

Conclusions: Implementation of a pharmacist-led transition of care service at discharge is beneficial. The results of the pilot and follow-up study support service expansion to additional hospital nursing units.

United States. The tertiary care, university-affiliated, teaching and community hospital is licensed for 550 beds and includes the region's only Level 1 Trauma Center. The pharmacy department operates 24 hours a day with approximately 30 professional and 25 supporting staff members. In an effort to expand the pharmacy's ability to assist with transitions of care in the ED, an admission medication reconciliation program was implemented in 2014. In this program, a pharmacy technician and interns work to obtain accurate and complete home medication lists for patients, allowing the ED clinical pharmacist to focus on resolving admission medication reconciliation discrepancies and assisting with direct patient care. During a six-month pilot of the ED program, a total of 19,734 errors were identified and corrected (mean of 3.7 errors per patient). Common errors identified on the admission home medication lists included: missing medications, extra medications that were previously discontinued, and incorrect medication doses. Currently at St. Elizabeth Youngstown Hospital, this program includes one full time pharmacy technician and 11 part time pharmacy interns who provide medication reconciliation assistance seven days a week. The program's success has allowed for expansion of the model to two additional Bon Secours Mercy Health hospitals within the Youngstown region.

After observing the benefits of the pharmacy's reconciliation service in the ED, it was identified that improvements were needed with transitions of care at the time of patient discharge from an inpatient hospital stay. The discharge medication reconciliation process requires careful coordination, often involving several specialists and/or hospitalists who may not provide care for the patient post-discharge. It was noted by the ED pharmacy medication reconciliation staff and clinical pharmacists rounding on patient care teams that medication reconciliation mistakes made at discharge often carried over into the home medication list for the next admission. A quality improvement project was designed by the pharmacy department to implement and evaluate a discharge pharmacist-led transition of care service. In addition to improving transitions of care and education at discharge, intended

FIGURE 1. POET Service Progress Note Documentation Template

Patient Demographics

Name*: _____
 Medical Record Number*: _____
 Gender*: _____ Age*: _____ Birthdate*: _____
 Primary Care Physician*: _____
 Primary Care Physician phone number*: _____
 Readmission Risk (%): _____
 Patient plans to participate in SEYH Meds to Beds Services (Y/N): _____

Pharmacist Review and Summary of Medications

Date of last review/update: _____

Category	Comments
New Medication Started	
Change in Outpatient Medication (Dosage Form, Route, Dose, or Frequency)	
Discontinued Outpatient Medication (or on Hold During Admission)	
Other	

Pharmacist Patient Education:

Date	Person Educated	Content of Education

Documentation of Pharmacist Interventions and Follow-up Plan:

The following Pharmacist Transition of Care Services were completed:

- Reviewed and summarized medication changes
- Entire home medication list was reviewed for accuracy (list sources:)
- Home medication list was updated or corrected
- Discharge medication list was updated or corrected
- Patient education was provided on new medications
- Patient education was provided on medication changes
- Reviewed the After Visit Summary (AVS) with patient

Additional Interventions:

- Inpatient prescriber was contacted and the following pharmacy recommendations were accepted:
- Other interventions:

Pharmacist*: _____

Date*: _____ Time spent counseling on medications: _____ minutes

**Data is populated automatically by the hospital's EHR*

FIGURE 2. POET Service Medication Reconciliation Documentation Template

Medication Reconciliation Unintentional Discrepancy Category Documentation:
___ Admission Medication Reconciliation
___ Discharge Medication Reconciliation

Unintentional Discrepancy Category (list number in each category below):

Inaccurate
Incorrect or Extra Medication:
Incorrect Dose:
Incorrect Route of Administration:
Incorrect Frequency:
Incorrect Dosage Form:
Other:

Incomplete
Omitted Medication:
Omitted Dose:
Omitted Frequency:
Other:

Total number of discrepancies:

The discrepancies identified above were the result of a:
___ Medication history error
___ Reconciliation error
___ Both history and reconciliation errors were made

outcomes of the service included: expanding unit-based pharmacy services to improve pharmacist identification and correction of drug therapy problems, reducing hospital readmissions and ED visits at 30-days post-discharge, and improving Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores.

The Practice Advancement Program Description

In late 2016, a pharmacist-optimized education and transition (POET) service pilot program was developed on an intermediate telemetry unit. This unit was selected for having the highest readmission rate in the hospital. Patients with atrial fibrillation, heart failure, and chronic obstructive pulmonary disease are commonly admitted to this 28-bed nursing unit. Prior to implementation, several

of the hospital's centralized pharmacists participated in a training program led by a clinical pharmacist. Medication reconciliation training materials were developed for the hospital's electronic health record (EHR) as well as tip sheets on the following: obtaining accurate and complete home medication lists, identifying and correcting medication reconciliation discrepancies, providing patient education using the teach-back approach, and the suggested daily transitions of care workflow.

Four pharmacists rotate through one role Monday through Friday to provide education and transition of care services to patients located on the intermediate telemetry unit. The service is currently limited to those patients with a planned discharge to home. The pharmacist begins each day by attending quality flow rounds with the unit's nursing staff, case manager, and social worker. During the daily quality flow rounds, nurses give a brief summary

of their patients, the discharge plan for each patient, and any barriers to discharge that need addressed by case management or social work. Attending the quality flow rounds in the morning helps the pharmacist to prioritize their chart review of patients during the remainder of the day.

The pharmacist works at a designated computer station on the nursing unit, utilizing a patient list in the EHR to determine when a discharge order has been placed and when discharge medication reconciliation has been completed by the provider. Patients with active discharge orders are prioritized first; however, as time allows, the pharmacist also works ahead to review patients who are expected to be discharged in the near future. The pharmacist reviews progress notes, laboratory data, recorded vital signs, the medication administration record (MAR), and relevant microbiology results for each patient. If discharge medication reconciliation has been completed by the discharging provider, it is then reviewed by the pharmacist to identify the potential unintentional discrepancies (i.e., medication changes that cannot be explained by the chart review) and additional drug therapy problems. The pharmacist corrects both the home and discharge medication lists as needed after speaking with patients, providers, and/or outpatient pharmacies. The pharmacist then reviews the medication portion of the discharge paperwork with the patient and provides education on new medications, medications that were discontinued, and medication doses/frequencies that were changed during hospitalization. The patient is also informed of when doses are due next for each new and continued medication. The pharmacist provides patient education materials when counseling on new medications. These materials are prepared by the pharmacy department and stored on the hospital's intranet system for printing on the nursing unit as needed. The medication handouts are written in an easy to read, patient-friendly language and focus on the medication purpose and common side effects.

Although the focus of the POET service is discharge reconciliation, if time allows, the pharmacist also reviews admission reconciliation for patients who did not have

a home medication list reviewed by the ED pharmacy medication reconciliation staff and those patients with a home medication list or admission medication reconciliation that is not marked as complete in the EHR. Additional activities involve identifying and overcoming barriers to medication access post-discharge and pharmacist encouragement of medication adherence. This includes assisting with the pharmacy's growing meds to beds program, a service which offers patients their first fill of discharge medications before leaving the nursing unit.

A progress note is documented in the EHR by the pharmacist at the time of initial chart review to outline the medication changes that have occurred during the hospitalization and to record the transition of care activities that were completed by the pharmacist (Figure 1). The progress note can be copied in the EHR and revised throughout hospitalization when new medication information is obtained and/or additional pharmacist activities are completed. Use of a consistent progress note that can be easily updated helps to avoid redundant activities between the pharmacists as they rotate through the role. The pharmacist's review of medication reconciliation, including the number and type of reconciliation discrepancies identified, is documented as an intervention in the EHR for pharmacy department tracking (Figure 2). The pharmacist also documents medication interventions that were made to solve the reconciliation discrepancies and additional drug therapy problems in the EHR using the following categories: drug discontinuation, drug initiation, drug therapy change, dosage adjustment, and miscellaneous. An intervention is also recorded to document patient education and adverse drug event prevention. In late 2018, the pharmacists also incorporated documentation of intervention categories that contributed to the hospital's antimicrobial stewardship efforts (e.g., bug-drug mismatch, de-escalation of antimicrobial therapy and dose optimization).

TABLE 1. Readmission and Emergency Department (ED) Visitation Rate (at 30 days)

<i>Outcome*</i>	<i>Nursing Unit Baseline (Historical Data from 2016)</i>	<i>Pilot Program Results (December 2016 to June 2017)</i>
30-day readmission rate	31.8%	23.4% (26.4% relative reduction over baseline)
Readmissions per patient	2.35	1.26 (46.4% relative reduction over baseline)
30-day ED visitation	40.7%	11.8% (71% relative reduction over baseline)

*Patients who expired prior to 30 days post-discharge were excluded from readmission and ED visit outcome analysis. Patients with a scheduled readmission were excluded from readmission outcome analysis.

Program Evaluation (Methods)

The pharmacy department received institutional review board approval to evaluate the effects of the POET service during a pilot period (December 2016 to June 2017) and compare the results to the nursing unit's historical data on the 30-day readmission rate, 30-day ED visit rate, and HCAHPS scores. Patients with a planned discharge to home who received the POET services were included in the pilot study. Patients with a planned discharge to a long-term care facility or skilled nursing unit did not receive the pharmacist-led services and were not included in the pilot study. Patients who left the hospital against medical advice were excluded from analysis. The transition of care activities performed by the pharmacist were discontinued if the patient was transferred to another nursing unit prior to discharge, however these patients were included in the quality improvement analysis and evaluated for program outcomes. To perform the retrospective data collection, all patients who received any transition of care services performed by the pilot pharmacy service were included on a patient list in the EHR that was accessed post-discharge by one clinical pharmacist (program coordinator). The patients were followed for 30 days post-discharge.

Data was collected on the following outcomes for the pilot patients: pharmacist identification and correction of medication reconciliation discrepancies, drug therapy problems, adverse drug events (as documented by the pharmacists in the EHR as progress notes and interventions); hospital readmissions at 30 days post-discharge; and ED visits

without admission at 30 days post-discharge. Although one clinical pharmacist performed the retrospective chart review to collect patient data, the discrepancies and drug therapy problems for each patient were identified by one of several POET service pharmacists. Adverse drug events were classified by the one clinical pharmacist as high risk (e.g., low dose of a life-saving drug, omitted order for a life-saving medication) or medium risk (e.g., high risk medication for the elderly, medication continued at discharge that was meant to be stopped, medication that could exacerbate a patient's condition). Descriptive statistics were used to analyze the patient data.

Program Benefits (Results)

During the pilot period, pharmacists interacted with 497 patients and identified 336 unintentional discrepancies on discharge medication reconciliation. Of these discrepancies, 217 (65%) were due to inaccurate information and 119 (35%) were due to incomplete information. Examples of discrepancies due to inaccurate information include: extra medication(s) and incorrect dose, frequency, route of administration or dosage form. Examples of discrepancies due to incomplete information include: missing medication(s) and missing dose or frequency. Discrepancies at discharge were caused by provider reconciliation errors (51%), history errors due to incomplete or inaccurate home medication information (18%), or a combination of reconciliation and history errors (31%). Discrepancies due to reconciliation errors were commonly attributed to inappropriate therapeutic duplication and accidental

TABLE 2. Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Survey Data

<i>HCAHPS Survey Data</i>	<i>Nursing Unit Baseline (Historical Data from 2016)</i>	<i>Nursing Unit Average During POET Pilot Program (December 2016 to June 2017)</i>	<i>% Increase in Score Over 2016</i>
Overall Rating of the Hospital	62.4	71.2	14.1%
Communication with Nurses	77.6	87.6	12.9%
Help from Hospital Staff	57.5	67.9	18.1%
Explain about Medications	52.2	60.1	15.1%
Discharge Instructions	78.2	85.7	9.6%
Care Transitions	42.1	48.8	15.9%

re-initiation of medications that were held/stopped at admission due to an adverse event. In addition, the primary provider often completed discharge medication reconciliation prior to reviewing a specialist's current recommendations and/or orders for the patient.

Pharmacists solved 392 drug therapy problems, including correction of reconciliation discrepancies, with a provider recommendation acceptance rate of 90.6%. Pharmacist recommendations to solve drug therapy problems included: drug discontinuation (32%), drug initiation (20%), therapy change (7%), and dose change (22%). In addition, 19% of the drug therapy problems were solved with miscellaneous recommendations such as monitoring vital signs and obtaining prescriptions for medication refills prior to discharge. After reviewing the drug therapy problems identified, the clinical pharmacist performing data collection classified 126 of the drug therapy problems (32%) as significant enough that an adverse event and/or readmission was probable if appropriate action was not taken. A total of 104 adverse events were prevented (25 high risk events and 79 medium risk events). Examples of prevented adverse events included duplicate anticoagulation therapy, concomitant prescription of sacubitril/valsartan with an ACE inhibitor, and omitted orders to continue antiplatelet agents and antibiotic therapy at discharge.

The program resulted in a decreased 30-day readmission rate and a decreased

30-day ED visit rate (without admission) when compared to the nursing unit's historical data from 2016 (Table 1). The number of readmissions per patient was also decreased. The HCAHPS survey scores improved during the pilot period by an average of 14% (when compared to nursing unit historical data from 2016) for the following categories: overall rating of the hospital, communication with nurses, help from hospital staff, communication about medications, discharge instructions, and care transitions (Table 2). It is important to note that the hospital continuously works to improve patient satisfaction and that the increase in HCAHPS scores cannot be attributed solely to the pharmacy-led service.

Using data from the pilot study and cost information supplied by the hospital's finance department, cost savings related to avoided patient admissions and ED visits were estimated at \$851,000 per year. In addition, estimated savings from the accepted pharmacist medication interventions and the adverse events prevented (calculated using intervention cost data provided by the EHR) were approximately \$1,000,000 per year. The total estimated cost avoidance and cost savings for the program equates to 14 times the pharmacist cost of providing the service. Of note, estimated savings related to pharmacist interventions were substantiated by a hospital finance report showing a decreased length of stay and an operational margin or financial

improvement of \$890,000 per 6 months or \$1,780,000 per year for patients who were involved in the pilot program. Yearly cost avoidance and cost savings associated with the pharmacist pilot program would range from \$1,851,000 to \$2,631,000 when using two of the above three savings figures.

Program Follow-up

In 2018, the pharmacy department received institutional review board approval to continue evaluation of the POET service and determine the patient populations that most benefit from pharmacist-led interventions. This follow-up study collected data on 418 patients who were discharged to home (from May 1 to October 31, 2018) after receiving pharmacy-led transition of care services. Data was collected in a similar manner as the pilot study. In addition, the follow-up study collected data to determine program benefit for the following patient subgroups: age (greater than or equal to 65 years and less than 65 years); the EHR's readmission risk score (low, medium and high risk); admission diagnosis associated with the Centers for Medicare and Medicaid Services (CMS) readmission penalties (i.e., heart failure, chronic obstructive pulmonary disease, acute myocardial infarction, coronary artery bypass graft surgery, pneumonia, and elective primary total hip and/or knee arthroplasty); payor financial class (commercial, Medicare, Medicaid, self-pay, and other); and patient enrollment in the health system's population health program.

During the follow-up study period, there were 382 discharge medication reconciliation reviews performed and the pharmacists identified 293 unintentional medication reconciliation discrepancies. Of these discrepancies, 173 (59%) were due to inaccurate information and 120 (41%) were due to incomplete information. Pharmacists provided recommendations to solve 470 drug therapy problems, including prevention of 96 adverse events prior to discharge. The POET service demonstrated a continued benefit at reducing the 30-day readmission rate. Readmissions decreased to 16.8% in the follow-up study, which is a 28.2% relative reduction over the pilot program period and a 47.2% relative reduction over the nursing unit's

historical baseline prior to POET service implementation. The ED visit rate within 30 days of discharge remained static at 11.7% when compared to the pilot study rate of 11.8%. Data from the follow-up study revealed that the POET service had the largest benefit on reducing readmission for the following patient groups: patients with higher readmission risk scores and patients with an admission diagnosis of heart failure, acute myocardial infarction, chronic obstructive pulmonary disease, or pneumonia. The HCAHPS survey scores on the POET nursing unit were higher when compared to other nursing units in the hospital during the same time period.

Discussion

In addition to the benefits of reducing readmissions and ED visits, increasing patient satisfaction, and improving patient safety; the pharmacy department has received positive feedback on the POET service from patients, nurses, and providers. The program has resulted in further pharmacy decentralization and expansion of clinical pharmacy services to additional patients on a telemetry nursing unit that was previously without a dedicated clinical pharmacist. Pharmacist face-to-face interactions with providers have increased and pharmacists participating in the program at our hospital have experienced increased job satisfaction. The program also now serves as an additional training environment for pharmacy residents and students, who can serve as pharmacist extenders to increase the number of patients reached by the program. Learner feedback has been very positive and expansion to include longitudinal residency activities is under consideration. This may include incorporating a post-discharge follow-up component to the POET service, such as telephone communication after discharge.

When implementing a pharmacy-led transition of care and patient education hospital program, the development of a dedicated pharmacist role is necessary to consistently provide the service. The pharmacist scheduled for the service at our hospital is present on the nursing unit for the entire shift. Previously, the pharmacy department's attempts to provide this service were less successful when the

model included pulling pharmacists from other roles during slower order verification periods.

An organized training program was important for our pharmacists prior to participation and as program changes occurred. In addition to a comprehensive orientation to the hospital's medication reconciliation process, it is imperative that pharmacists understand and complement the current nursing unit workflow to facilitate effective communication and efficient patient discharge. This includes establishing a process for timely identification of patients who will be discharging to maximize the time available for pharmacist reconciliation review and patient education. Pharmacists were also required to develop a better understanding of case managers' and social workers' roles on the nursing unit to collaborate effectively and overcome discharge medication therapy barriers.

It is helpful to designate a program coordinator to develop the program structure and provide consistent training to participating pharmacists, residents, and students. The coordinator can also serve as a point person to assist with pharmacist questions and discharge issues that may occur. In the early stages of program implementation, it is important to allow adequate time to collect and analyze outcome measures to support the current program and justify program expansion. The program coordinator can also assist with these activities.

During program development, pharmacists may find that it is helpful to discuss the service and outcome measures with hospital administration early in the planning stage to ensure that the most important patient population to target and the most valuable data to collect have been identified and agreed upon. Our initial program targeted all patients on one telemetry nursing unit with a plan to discharge to home. However, based on the results of the follow-up study, we are currently discussing the possibility of program modification to prioritize specific patient groups on several nursing units (such as patients with higher readmission risk scores or a disease state associated with the CMS readmission penalties).

One of the largest challenges

experienced by our program is the inability to increase the number of patients that can be reached by the pharmacist each day. This number varies depending on patient complexity and the number of active discharges, but usually ranges from 5 to 10 patients per day. Due to the large number of discrepancies and drug therapy problems at discharge and the time required to identify and resolve these issues, we are currently unable to review additional patients without expanding our service to include additional pharmacists or pharmacist extenders. It can also be challenging to provide the complete discharge transition of care service to each patient and resolve all identified problems prior to discharge, as some patients may leave the nursing unit soon after the discharge order has been placed by the provider. The pharmacists work closely with the nursing staff to attempt to identify discharges prior to the provider placing the discharge order. Whenever possible, patients with a planned discharge to home are also reviewed prior to the actual discharge day so that drug therapy problems can be identified and resolved ahead of time.

Conclusion

With the implementation of the practice advancement of a pharmacist-led education and transition of care services at discharge, an intermediate telemetry nursing unit at our hospital experienced a decrease in both the 30-day readmission rate and ED visit rate, an improvement in nursing unit patient satisfaction scores, and increased pharmacist identification and resolution of medication reconciliation discrepancies and drug therapy problems. The results of the pilot program study and the follow-up study support continuation of the program, program growth with increased pharmacist participation, and expansion to additional hospital nursing units.

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