JPPT | Quality Improvement Initiative

Development of a Discharge Counseling and Medication Reconciliation Process for Pediatric Patients Within a Large, Academic Health System

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OBJECTIVE This study aims to characterize the impact of a pharmacist-driven discharge medication reconciliation and counseling program targeting high-risk pediatric patients to mitigate barriers in transitions of care.

METHODS This was a single-center quality improvement initiative including high-risk pediatric patients within a large academic medical center. Pharmacy, medical, and information technology team members developed a scoring system to identify patients at high risk of hospital readmission that resulted in a trigger tool built within the electronic medical record (EMR). Pharmacy workflow, the EMR documentation, and staff training were implemented. The primary end point was the number of high-risk patients with complete medication reconciliation and/or discharge counseling performed during the first 2 months after implementation. The secondary end points included quantification and qualification of the interventions conducted by a pharmacist.

RESULTS Pediatric clinical pharmacists conducted discharge medication reconciliation and/or counseling for 60 patients during the first 2 months after implementation. There were 65 interventions performed, including 60 discharge medication reconciliations and 5 discharge counseling sessions. Of these interventions, 22 were recommendations on appropriate medication dosing and frequency (37%), 12 on duration of therapy (20%), and 8 were medication additions (13%). There were 6 interventions on adherence assistance (10%), 6 involved selection of medication formulation (10%), 3 involved medication discontinuation (5%), 2 involved appropriate therapy selection (3%), and 1 involved medication stability (1%). All interventions were accepted and implemented by the prescribing providers.

CONCLUSIONS Pharmacist-driven discharge medication reconciliation and counseling programs targeting pediatric high-risk population might be an effective tool to mitigate gaps in transitions of care.

ABBREVIATIONS AEDs, antiepileptic drugs; ASHP, American Society of Health-System Pharmacists; EMR, electronic medical record; ISMP, Institute for Safe Medication Practices; IS, immunosuppressants; KIDs, key potentially inappropriate drugs; PPAG, Pediatric Pharmacy Advocacy Group

KEYWORDS discharge medication counseling; medication reconciliation; pediatrics; pharmacists

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Introduction

Medication errors are one of the most common types of errors in hospitalized patients.[1] More so, medication errors are 3 times more common in the pediatric population compared with adults[2] because of complex medication dosing regimens and administration. More than 70,000 pediatric emergency department annual visits in the United States are reported to be due to medication overdoses.[3] One of the potential causes in most of these visits is poor medication reconciliation practices during transitions of care.[3,4] Transitions from inpatient to outpatient care pose the highest risk for medication errors.[4,5] As an example, a prospective study showed that 8% of medications for pediatric patients at discharge had discrepancies between sources of documentation.[6]

Studies have identified a lack of standardization in discharge medication reconciliation and caregivers' counseling as a contributing factor to a high probability of medication error after discharge.[3] Often times, these medication errors are preventable.

The Joint Commission defines medication reconciliation as the "process of comparing patient's medication orders to all of the medications that the patient has been taking."[7] In 2005, The Joint Commission added medication reconciliation to a National Patient Safety Goal list.[8]

In 2006, the World Health Organization Collaborating Center for Patient Safety Solutions included medication reconciliation as one of the standardized patient safety measures.[9] Various organizations around the world recognize that increasing medication reconciliation rates remain challenging for many institutions.[8] Lack of electronic health record data at outpatient pharmacies and lack of dedicated resources to perform medication reconciliation can contribute to that. The American Society of Health-System Pharmacists (ASHP) Guideline on Preventing Medication Errors in Hospitals highlights the role for pharmacist involvement in the medication reconciliation process prior to discharge.[10] Additionally, the ASHP–Pediatric Pharmacy Advocacy Group (PPAG) Guidelines for Providing Pediatric Pharmacy Services in Hospitals and Health Systems emphasize that one of the pharmacists' responsibilities include "timely, safe, and accurate medication reconciliation."[11]

Pediatric medication reconciliation brings its own unique challenges. First, pediatric medication reconciliation and counseling often involves discussion with caregivers, who may have limited health literacy or lack fluency in the English language.[12] Second, the inability of children to swallow solid dosage forms and a lack of commercially available liquid dosage forms often leads to the use of compounded preparations that can vary in concentration.[12] Finally, pediatric medications are dosed by weight, which can change frequently in a growing child and can contribute to dosing errors.[12] All of these factors emphasize the importance of medication reconciliation in the pediatric population.

As medication experts, pharmacists are trained in medication reconciliation and counseling, which makes them the ideal providers to perform these functions. Literature to date is mainly focused on admission medication reconciliation in adults. Huynh et al[9] emphasized that medication errors at transitions of care can be decreased by a pharmacist-led medication reconciliation program, including discharge medication reconciliation and counseling services. Currently, there is a lack of data regarding discharge medication reconciliation and counseling in pediatric patients specifically. The objective of this initiative was to characterize the impact of a pharmacist-driven discharge medication reconciliation and counseling program targeting high-risk pediatric patients to mitigate barriers in transitions of care.

Materials and Methods

This was a single-center quality improvement initiative including high-risk pediatric patients within a large academic medical center. A scoring tool was developed based on the Institute for Safe Medication Practices (ISMP) lists of high-alert medications, key potentially inappropriate drugs (KIDs) list, and literature review[13–22] focusing on the pediatric population with a high risk for hospital readmission. Identified high-risk criteria within the study population included hospital readmission or 2 or more emergency department visits in the past 6 months, history of organ transplantation, patients who take 5 or more medications outpatient, lack of health insurance, and patients for whom English is not their first language (Table 1). In addition, patients who were started on a high-alert medication, as defined by the ISMP List of High-Alert Medications in Acute Care Settings, ISMP List of High-Alert Medications in Community/Ambulatory Healthcare, ISMP List of High-Alert Medications in Long-Term Care (LTC) Settings, and the KIDs List (Supplemental Table) were included. Based on the scoring system, a trigger tool was built into the EMR for use by pharmacists to identify patients who may benefit from discharge medication reconciliation and counseling. Total scores were color coded to help guide the pharmacist in triaging patients for medication reconciliation and counseling. Total scores from 0 to <3 were green, ≥3 to <9 appeared yellow, and scores ≥9 were in red. Scores were assigned on admission and updated in real time if any changes affecting a total score occurred.

Following the build of this tool, extensive testing and validation were completed in a test environment of our hospital's EMR to ensure that all the assigned criteria triggered appropriately. A standardized note template was created and used as documentation within the EMR.

An optimal workflow for the clinical pharmacist or pharmacy resident covering the assigned patient unit was established. Of note, pharmacy residents on rotation performed analogous functions as clinical pharmacists, as deemed appropriate; therefore, the term "pharmacist" was used interchangeably. The pharmacist determined daily which patients were candidates for discharge medication reconciliation and counseling based on patient volume, pediatric discharge EMR trigger tool, discharge order, and discharge status. Anticipated discharge date and time were discussed by the primary team with the pharmacist the day in advance or morning of rounds

Table 1. Defined High-Risk Criteria for Hospital Readmission

Criteria	Score
Readmission or ≥2 ED visits in the past 6 mo	2
Organ transplant	2
Patient has ≥5 outpatient medications	2
Socioeconomic factors	
Lack of health insurance	1
English not first language	1
Number of high-alert medications (inpatient AND outpatient)	1 per each medication

ED, emergency department

to allow sufficient time to perform medication reconciliation and counseling. The pharmacist reviewed patients' discharge medication list and discussed any interventions with the team in real time. The pharmacist documented all interventions in the EMR using a standard note template (Figures 1 and 2).

Education and training were conducted prior to the pilot implementation, including a pharmacy staff in-service and medical resident education session. The pharmacy staff in-service highlighted the significance of the trigger tool in identifying patients who may benefit from discharge medication reconciliation and/or counseling and proposed workflow for daily use by the pharmacist covering the assigned unit. The medical resident education session emphasized the pharmacist's role in the medication reconciliation process and defined the responsibilities of team members involved in the process.

Figure 1. Discharge medication reconciliation pharmacist documentation template.

Pediatric Discharge Medication Reconciliation Note

A review of medications has been conducted by the pharmacist prior to anticipated discharge.
Pediatric discharge column score:
Number of intervention(s):
Type of intervention(s):

- ☐ Medication dosing/frequency
- ☐ Duration of therapy
- ☐ Duration of therapy
- ☐ Discontinuation of medication(s)
- ☐ Addition of medication(s)
- ☐ Adherence assistance
- ☐ Medication formulation
- ☐ Therapy selection
- ☐ Other

I have reviewed the after visit summary and compared to the current inpatient regimen. I agree with the discharge medication plan.

Pharmacist's name
Today's date
Current time

Figure 2. Discharge medication counseling pharmacist documentation template.

Pediatric Discharge Medication Counseling Note

At today's visit, patient's name and patient's caregiver(s) was/were being counseled on medication name for treatment of symptoms consistent of disease

Interpreter used for encounter: interpreter's name/contact information

In addition, the following education was provided:

- ☐ Purpose of each medication
- ☐ Administration instructions
- ☐ Possible side effects of therapy
- ☐ Anticipated duration of therapy
- ☐ Storage and stability of medications

Patient's caregiver was advised to contact their primary care provider with medication questions or concerns following discharge. Patient's name and patient's caregiver(s) verbalized understanding of discharge medication plan and medication education.

All visit information discussed with the referring provider/primary team.

Pharmacist's name
Today's date
Current time

The primary end point evaluated was the number of high-risk patients with complete medication reconciliation and discharge counseling during the first 2 months after implementation. The secondary end points included average number of interventions identified per patient and the type of interventions conducted by a pharmacist.

Results

During the first 2 months after implementation, pediatric pharmacists performed discharge medication reconciliation and/or counseling for 60 high-risk pediatric patients and identified 65 interventions, through 60 discharge medication reconciliations and 5 discharge counseling sessions (mean ± SD number of interventions per patient, 1.08 ± 0.85; Table 2). Of note, upon discharge medication reconciliation by the pharmacist, 15 of 60 patients (25%) did not require further pharmacist intervention.

Most interventions made by the pharmacist (22 of 60) were recommendations on appropriate medication dosing and frequency (37%), followed by 12 related to duration of therapy (20%), and 8 recommending medication additions (13%). In addition, 6 interventions were related to adherence assistance (10%), 6 included selection of medication formulation (10%), 3 recommended medication discontinuation (5%), 2 appropriate therapy selection (3%), and 1 other intervention (2%) that was a recommendation on the need for an additional prescription due to the medication's short stability (Figure 3). All of these interventions were accepted by the prescribing provider.

Discussion

There is a lack of data surrounding medication reconciliation practices within the pediatric population. Current literature is focused primarily on admission medication reconciliation in adults.[23,24] Thus, the objective of this study was to implement a pharmacist-driven discharge medication reconciliation and counseling program targeting high-risk pediatric patients during transitions of care. The patient population included in the current study focused on pediatric patients cared for on general pediatric units meeting criteria for high-risk status. This patient population was chosen because of the high risk of readmission as documented in the literature,[25] therefore highlighting a population that may benefit from targeted interventions of medication reconciliation practices during transitions of care.

Table 2. Discharge Medication Reconciliation and Counseling Sessions in the First 2 Months After Implementation

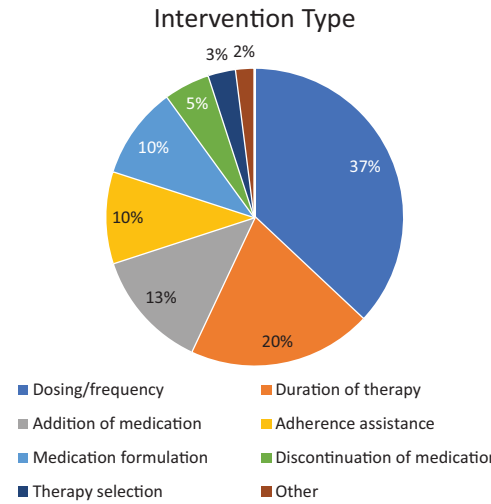
	Value
Total number of high-risk patients identified by the pharmacist	60
Total number of interventions	65
Discharge medication reconciliation	60
Discharge medication counseling	5

There is aforementioned limited published data surrounding pediatric medication reconciliation. In a study by Nguyen et al[26] that aimed to add pharmacy discharge services to aid in the transitions of care for clinically complex pediatric patients, pharmacists resolved medication discrepancies, conducted follow-up telephone calls, and provided discharge counseling at 3 time points after discharge. Pharmacists provided discharge counseling for 56 discharges (17%) and identified 168 interventions, in which 93.5% were accepted or informational.[26] The most identified interventions were clarifying a drug order, dose rounding, and assisting in obtaining medication, leading to an estimated cost savings of $22,308 in the first 5 months.[26] In our current study, 60 pediatric patients were evaluated by a pharmacist at discharge where 65 interventions were identified. Most common interventions were recommendations on appropriate medication dosing and frequency, duration of therapy, and medication additions.

To highlight the significance of the pharmacist's impact on individual patients, examples of pharmacist interventions in 2 high-risk patients follow.

There was a 4-year-old female with a past medical history of 2 incidences of orthotopic liver transplantation, admitted with steroid-resistant acute cellular rejection. Patient's hospital stay was complicated by adenovirus gastroenteritis, prolonged COVID-19 viremia, Epstein-Barr virus viremia, and rectal bleeding. High-risk criteria scoring at the time of intervention was 10, where a score of 2 was for readmission or ≥2 ED visits in the past 6 months; a score of 2 was for

Figure 3. Types of intervention performed by a pharmacist.



being an organ transplant patient; a score of 2 was for being on more than 5 outpatient medications; and a score of 4 was for receiving 4 high-alert medications, including aspirin, mycophenolate, tacrolimus, and prednisolone. The pharmacist made a significant impact on this patient's medication regimen by changing tacrolimus and sodium chloride dosage formulations from oral suspension to capsules, changing the dosing frequency of sodium phosphate, potassium phosphate (PHOS-NaK) from 3 times daily to once daily, and modifying the duration of fluconazole from 14 days to until discontinued by the provider given use as prophylactic agent. All the changes were made according to inpatient regimen, discharge plan, and nephrology recommendations.

Another example was a 19-year-old woman with past medical history of end-stage renal disease secondary to lupus nephritis on peritoneal dialysis admitted because of culture-negative peritonitis, who was transitioned to intermittent hemodialysis during this admission. High-risk criteria scoring at the time of intervention was 9, where a score of 2 was for readmission or ≥2 ED visits in the past 6 months; a score of 2 for being on more than 5 outpatient medications; and a score of 5 for receiving 5 high-alert medications, including apixaban, propranolol, prednisone, mycophenolate, and levetiracetam. The pharmacist intervened on changing dosing frequency of epoetin alfa from once weekly to 3 times weekly with intermittent hemodialysis and levetiracetam from 750 mg orally daily to 250 mg orally post-dialysis. These recommendations were made according to inpatient regimen and discharge plan.

Because a review of discharge medications by the pharmacist identified no need for further intervention in 25% of the high-risk patients, further optimization of the trigger tool may be warranted.

The results of our study were similar to the findings in the study by Nguyen et al[26]; however, estimated cost savings were not evaluated in our study. The pilot phase of our discharge medication reconciliation and counseling program was implemented in a cost-neutral manner. Larger studies are needed to determine the potential cost savings associated with reduced hospital readmissions due to medication errors.

Implementation of similar programs in other health centers may improve the pediatric discharge process by optimizing medication therapy, improving patients' and caregivers' medication understanding, and potential cost savings. Incorporating pharmacy residents and pharmacy students in the process may provide an additional learning opportunity and a cost-saving initiative for the hospital. Studies such as ours demonstrate the need for pharmacist intervention in transitions of care for pediatric patients.

Some of the barriers identified during this study included prioritization of EMR optimization requests during a pandemic, coordination of workflow with bedside delivery of medications, and limited resources to support weekend and evening discharges. In addition, one of the limitations of our study was a lack of comparative data on the total number of pediatric patients on service during the 2-month period.

Allocation of pharmacy resources toward discharge medication reconciliation and counseling, expansion of the program into other pediatric departments, and further assessment of pharmacist impact on patient outcomes during transitions of care are among the future initiatives.

Conclusions

A pharmacist-led discharge medication reconciliation and counseling program targeting a high-risk pediatric population might be an effective initiative to minimize errors during transitions of care. Creating a trigger tool in the EMR may help pharmacists identify patients at the highest risk of medication errors following hospital discharge. Future studies are needed to evaluate reduction of medication errors after implementation of a pharmacist discharge medication reconciliation and counseling program.

Article Information

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