Clinical Pharmacy Discharge Counseling Service and the Impact on Readmission Rates in High-Risk Patients

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Abstract

Background: A number of patient safety and transition of care initiatives have highlighted the benefits of incorporating a clinical pharmacist in the discharge medication process. Numerous studies have identified the prominent and consequential role of medication therapy errors occurring at hospital discharge. **Objective:** The objective of this study was to evaluate the effects of a discharge medication counseling service on readmission rates, emergency department (ED) visits, and days to first readmission or ED visit in patients deemed high risk for hospital readmission. **Methods:** A retrospective chart review was conducted from October 2014 to December 2014 in adult patients admitted to a general medicine unit and identified as being at high risk for readmission. Endpoints were compared between patients who received discharge counseling (study group) and those who did not (control group). **Results:** Eighty-nine high-risk patient charts were reviewed. Forty-four patients were in the study group and 45 patients were in the control group. There were no differences between the baseline characteristics of both groups. There were no differences between the study and control groups in 30-day readmission rates (18.2% vs 26.7%; $P = .45$) and in 30-day ED visits (4.6% vs 11.1%; $P = .43$). The number of days to first readmission or ED visit between the study and control groups was 22 versus 12 ($P = .26$). **Conclusion:** Although no statistical difference was found between groups in this study, integration of a clinical pharmacist as part of an interdisciplinary approach in the discharge medication process resulted in numerical improvements in outcomes. Additional investigation is warranted to further highlight the potential benefits of this service.

Keywords

discharge counseling, hospital readmissions, pharmacist

Recent endeavors by the US health care system to reduce hospital readmissions have gained widespread attention due to implications on hospital reimbursement. Emphasis placed on reducing unnecessary hospital-related costs by the Patient Protection and Affordable Care Act has resulted in a focus on readmission rates as a key outcome measure for health systems.^{1–3} Studies show that 1 in 5 hospital discharges result in a readmission, indicating that more resources should be focused on the coordination of a comprehensive discharge planning process and postdischarge care planning.^{4,5}

The need to improve health care quality and outcomes has led to increased attention and support for structured discharge planning processes. Numerous patient safety and transition of care initiatives have highlighted the benefits of incorporating a clinical pharmacist into the discharge process.^{1,2,3,5} Recent literature has proven that pharmacists have the ability to play a vital role in this process by coordinating discharge medications and patient education. A prospective study published in 2013 by Pal and colleagues² demonstrated a 9.2% decrease

($P = .006$) in 30-day readmission rates in patients who received medication reconciliation and counseling by a pharmacist versus a comparator group receiving usual care. An observation study conducted by Anderegg and colleagues⁵ in 2014 showed a 5.5% decrease in 30-day readmission rates ($P = .042$) and a nonsignificant decrease in the 30-day rate of return to the emergency department (ED; 3.4%; $P = .098$) after implementation of a pharmacy practice model that included medication reconciliation and discharge education

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for high-risk patients. The authors projected that this decrease in readmission rates could result in an annual cost savings of more than \$780 000. Medication education helps prevent adverse drug events, promotes medication adherence, and encourages appropriate medication use.⁵

Recent data indicate that nearly 20% of patients discharged from the hospital experience a preventable adverse event within 3 weeks from discharge.⁶ The majority of these adverse events are considered to be medication related.⁶ With this compelling evidence in mind, strategically positioning a clinical pharmacist in the discharge process to help identify and prevent medication-related problems has the potential to improve medication use, patient outcomes, and quality of care.

The aim of this project was to evaluate the impact of a discharge medication counseling service on 3-day and 30-day readmission rates, ED visits, and days to first readmission or ED visits in patients deemed high risk for readmission at an academic medical center. To our knowledge, this is the first study to evaluate 3-day readmit rates and number of days from discharge to readmission or ED visit. These endpoints were included in addition to the more commonly studied 30-day readmission rates for quality assurance purposes based on prior reports of unacceptably high 3-day readmission rates and to more specifically measure the short-term impact of the pharmacist counseling services on overall adherence to discharge instructions.

Methods

A single-center retrospective review was conducted on adult patients admitted to a 76-bed general medicine unit at a large academic medical center from October to December 2014. Approval from the University of Texas Health Science Center at San Antonio Institutional Review Board was obtained.

Patients aged 18 years and older, admitted to the adult medicine service, and classified as being at high risk for hospital readmission within 30 days were included in the study. Patients were identified as high risk for readmission using a risk stratification tool called PIECES.⁷ This software system is a prioritization tool that was previously validated as a predictor of a patient's 30-day readmission risk. It calculates a risk score based on multiple factors, including diagnoses for chronic diseases, evidence of control of these diseases, lab results, social determinants of health, and so on. The risk assessment is integrated into the electronic medical record to allow providers quick and easy access to risk scores based on information already entered into the record. The cutoff of 48.3% likelihood of being readmitted within 30 days was classified as high risk at our institution based on the initial customized thresholds set by the team spearheading the risk stratification initiative.

Patients who were incarcerated, pregnant, deceased, or left the hospital against medical advice were excluded from the study. Given the retrospective nature of this study, patients who received counseling were not consented.

The pharmacy department implemented a consult-based pharmacy discharge counseling service for high-risk patients on the adult general medicine unit in October 2014. Upon implementation, providers on the general medicine service were educated on the availability of the clinical pharmacy consult service by means of distributed flyers as well as real-time reminders by pharmacists. Physicians initiated consults on patients who met criteria for being at high risk for readmission.

Upon receipt of a consult order, a clinical pharmacist performed discharge medication reconciliation to ensure appropriateness of therapy, evaluate drug allergies, and identify and request clarification on duplicate or unnecessary therapy. Patients were counseled on medication names, indications, mechanisms of action, directions for use, administration techniques/routes, potential drug/food interactions, side effects, and monitoring if needed. The pharmacist then assessed the effectiveness of the education provided by utilizing teach-back or show-back methods or by having the patient verbalize instructions. Patients received verbal and written education using Micromedex Carenotes and institution-specific medication brochures when available. Counseling was completing between 8:00 a.m. and 5:00 p.m., Monday through Friday. Patients who received discharge counseling through the consult service were identified retrospectively for data collection using an internal computerized pharmacy consult report.

The primary outcome of this analysis was to compare the effect of the discharge medication education on 3-day and 30-day readmission rates in high-risk patients who received counseling (study group) compared with high-risk patients admitted to the same unit during the same time period who did not receive counseling (control group). Secondary outcomes were to evaluate effects of the discharge medication education on 3-day and 30-day ED visits and the number of days to first readmission or ED visit between both groups.

Statistical Analysis

Data were analyzed using JMP 11.0.0 (SAS Institute, Cary, North Carolina). Continuous variables were tested for normality using the Shapiro-Wilk *W* test. Normally distributed continuous data were analyzed using the Student *t* test, and nonnormally distributed continuous data were analyzed using the Wilcoxon rank sum test. The chi-square or Fisher exact test was used to compare nominal data, as appropriate. An a priori alpha level of $\leq .05$ was used to determine statistical significance for all comparisons.

Results

During the 3-month study period, 44 high-risk patients received discharge medication counseling (study group). Forty-five high-risk patients who did not receive counseling were randomly selected to serve as the control group, for a total inclusion of 89 patients in this study. Most of the

Table 1. Baseline Demographic and Group Characteristics.

	Study group (n = 44)	Control (n = 45)	P value
Description			
Age, y, mean $\pm$ SD	55.1 $\pm$ 14.9	52.4 $\pm$ 16.3	.41
Male, n (%)	23 (52.3)	24 (53.3)	1.0
BMI, kg/m ² , mean $\pm$ SD	27.6 $\pm$ 7.8	28.4 $\pm$ 8.2	.62
Hospital LOS, d, median (range)	6 (4-8.8)	5 (3-8.5)	.17
Admission diagnosis, n (%)			
Neurologic	0 (0)	5 (11.1)	.06
Cardiac	5 (11.4)	4 (8.9)	.74
Pulmonary	5 (11.4)	4 (8.9)	.74
Renal	1 (2.3)	7 (15.6)	.06
Infectious	11 (25.0)	10 (22.2)	.81
GI/GU	10 (22.7)	9 (20.0)	.80
Hematology	4 (9.1)	1 (2.2)	.20
Endocrine	0 (0)	0 (0)	—
Other	8 (18.2)	5 (11.1)	.38
Race/ethnicity, n (%)			.77
White, non-Hispanic	20 (45.5)	25 (55.6)	
Black, non-Hispanic	3 (6.82)	3 (6.67)	
Hispanic/Latino	19 (43.2)	16 (35.6)	
Other	2 (4.6)	1 (2.2)	
Language, n (%)			.10
English	39 (88.6)	32 (71.1)	
Spanish	5 (11.4)	12 (26.7)	
Other	0 (0)	1 (2.2)	
Payor, n (%)			.78
SCF	11 (25.0)	12 (26.7)	
Medicaid	4 (9.1)	7 (15.6)	
Medicare	13 (29.6)	10 (22.2)	
Private	9 (20.5)	7 (15.6)	
Self	7 (15.9)	9 (20.0)	
No. of discharge medications, median (range)	7 (4.3-9.8)	8 (5-11)	.39

Note. BMI = body mass index; LOS = length of hospital stay; GI/GU = gastrointestinal/genitourinary; SCF = subsidized county funding.

discharge counseling was provided by the same pharmacist to ensure consistency in counseling and teaching methods. The mean ($\pm$ SD) ages of the patients were 55.1 $\pm$ 14.9 and 52.4 $\pm$ 16.3 years in the study and control groups, respectively. Forty-seven (52.8%) patients were male. The median (range) length of stay for the study and control groups was 6 (4-8.8) and 5 (3-8.5) days, respectively. There were no differences between the groups' baseline characteristics including initial diagnosis, ethnicity, primary language, or payor ($P > .05$, for all comparisons) as shown in Table 1. The median (range) number of discharge medications in study and control groups was 7 (4-10) and 8 (5-11) ($P = .39$), respectively.

The 3-day readmission rate was 4.6% and 6.7% ($P = 1.0$) and the 30-day readmission rate was 18.2% and 26.7% ($P = .45$) in the study group and the control group, respectively. The secondary outcome of ED visit rates in the study and control groups at 3 days after hospital discharge was 0% and 6.7% ($P = .24$) and at 30 days was 4.6% and 11.1% ($P = .43$), respectively. The number of days (range) to either first

readmission or ED visit was 22 (4-30) in the study group and 12 (4-20) in the control group ($P = .26$), as shown in Table 2.

Discussion

This study assessed the effects of discharge medication counseling on readmissions, ED visits, and days to first readmission or ED visit in patients deemed high risk for readmission. Results from this study are consistent with previous studies that have demonstrated reduced readmission rates when a clinical pharmacist is involved in medication counseling prior to discharge.^{2,5,8-10} In an observational study, Anderegg et al⁵ reported a significant reduction in 30-day readmission rates of high-risk patients; rates declined from 17.8% to 12.3% ($P = .042$) after patients received discharge education and medication reconciliation. Studies by Wilkinson et al⁸ and Warden et al⁹ did not demonstrate statistical significance, but did establish numerical reductions in readmission rates and increased medication adherence in

Table 2. Outcome Analysis.

Outcomes	Study group (n = 44)	Control group (n = 45)	P value
3-day readmissions	4.6%	6.7%	1.0
30-day readmissions	18.2%	26.7%	.45
3-day ED visits	0%	6.7%	.24
30-day ED visits	4.6%	11.1%	.43
Median days to first readmission or ED visit, n (range)	22 (4-30)	12 (4-20)	.26

Note. ED = emergency department.

patients who received discharge medication counseling. Pharmacists in both studies provided discharge medication reconciliation and discharge medication instructions. Evaluation of baseline characteristics in this study indicated that the control and study groups were similar. No statistically significant difference was observed in the admission diagnosis, ethnicity, primary language, length of stay, or payor between groups, indicating less confounding baseline variables that may have increased the chance of hospital readmission. There was also no difference observed in the number of discharge medications between control and study groups, which eliminated the chance that one group was more at risk for a medication-related events than the other.

This study demonstrated that the discharge medication counseling service had an effect in reducing overall cumulative numbers of readmissions and ED visits, while increasing the numbers of days from discharge to first readmission or ED visit in patients deemed high risk for readmission.

None of the patients from the study group returned to the ED within 3 days of discharge compared with the control group, which had a 6.7% ED return rate. A greater than 2-fold increase in 30-day ED visits post discharge was seen in the control group compared with the study group. The duration of time (days) post discharge that it took high-risk patients to present to the ED or be readmitted the hospital was twice as long in the study group compared with the control group. These results indicate a possible correlation between medication-related problems in high-risk patients and readmission rates, unplanned ED visits, and number of days to first readmission or ED visit.

This study was not without limitations. Given that it was a retrospective review, confounding variables and potential bias that could not be controlled may have occurred. Also, the 3-month duration of the study yielded a relatively small sample size, and therefore, this study was underpowered to show a significant difference in the primary outcome. A larger sample size may have provided a more comprehensive assessment of the effectiveness of the discharge counseling service. Patients were defined as high risk if they were calculated to have at least a 48.3% likelihood of being readmitted within 30 days according to the PIECES software program. However, the control group in this study had a lower than expected 30-day readmission rate (26.7%), which may have contributed to the lack of a statistically significant difference

between groups. The lower than expected 30-day readmission rate in the control group may have been attributed to other ongoing transition of care initiatives at the health system. These included a transition of care team comprised of a nurse case manager, social worker, and transition of care navigator that met daily to discuss discharge plans, funding source, and follow-up appointments and conduct postdischarge follow-up by phone for patients at high risk for 30-day readmission. It is likely that services provided by this team would have impacted both study and control groups in a similar fashion, because that initiative commenced prior to the start of our research and both groups included in our study were comprised of high-risk patients admitted to the same hospital unit. Postdischarge follow-up by a pharmacist was not incorporated into the pharmacy discharge counseling service due to lack of resources at the time; this may have also lead to a larger difference in outcomes between groups. Disposition of patients post discharge and admissions and ED visits to facilities outside of the health system were not accounted for in this study. This may have affected the readmission rates and ED visits reported in the study.

A major strength of the study was the availability of a validated customizable risk stratification tool, PIECES. The software helped identify patients who were high risk for readmission based on International Classification of Diseases, Ninth Revision (ICD-9) codes, procedure codes, lab values, and socioeconomic data. Readmission risk classifications in PIECES could be modified to identify patients with an even greater risk, which may have resulted in significant differences between groups. Other strengths include well-matched patient groups as previously mentioned and consistency in the discharge counseling provided, with one pharmacist conducting most of the education.

Conclusion

Discharge medication counseling provided by a clinical pharmacist to patients who were at high risk for readmission was associated with reduced 3-day and 30-day readmission rates and ED visits and an increased number of days to first readmission or ED visit. Although no statistical difference was found between groups, integration of a clinical pharmacist as part of the discharge medication process resulted in numerical improvements in all 3 major outcomes. Additional

investigation is necessary to further highlight the potential benefits of a pharmacist-led discharge counseling service for patients deemed to be at high risk for hospital readmission.

Declaration of Conflicting Interests

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