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Retrospective Evaluation of Pharmacy Student and or Resident Counseling and 30-Day Readmission in Heart Failure at a Northeastern Hospital

Shurui Dai, PharmD[1,#], Jayashri Sankaranarayanan, MPharm PhD[1,2*], Spencer T. Martin, PharmD, BCPS[2], Nicholas Tessier, PharmD, BCPS, MBA[2]

[1]Department of Pharmacy Practice, University of Connecticut, Storrs, CT, USA
[2]Department of Pharmacy Services, Hartford Hospital, Hartford, CT, USA

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***For Correspondence**

Jayashri Sankaranarayanan, MPharm PhD, Associate Professor, School of Pharmacy, University of Connecticut, Storrs, CT, USA, Tel: 402-321-3777.

E-mail: jsankara@live.com

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#PharmD Candidate during the conduct of the study.

ABSTRACT

Background: The retrospective study evaluated the association of pharmacy resident and or student discharge counseling service with 30-day all cause readmissions in heart failure.

Methods: Data were collected from electronic medical records of patients' (with a discharge diagnosis of heart failure) on age, gender, race, number of comorbidities, hospital length of stay in days, received intervention of "pharmacy resident and or student" counseling (yes/no) and number of readmissions. Multivariate logistic regression analyses studied the association of counseling intervention and "at least one 30-day readmission" after adjusting for patient characteristics. A *P* value of less than .05 was considered significant.

Results: The counseling intervention (130/362) versus the control group (232/362) was more likely to be male, Caucasian race, speak English, and have a longer length of stay. After adjusting for age, gender, race, primary language (English, yes vs. no), and length of stay; the counseled versus the not counseled patients were less likely to be readmitted (adjusted OR = 0.54, 95% CL = 0.32-0.91, p = 0.0207).

Conclusions: Heart Failure patients who received discharge counseling were significantly less likely to be readmitted than those who did not. Providers and payers implementing discharge counseling service need to reach female, non-english speaking, other race patients, and those with short length of stay.

INTRODUCTION

Heart failure (HF) is a complex and progressive cardiovascular disease affecting 5.7 million people in the United States [1]. A recent review of publically available data estimated indirect costs in terms of future earnings to be about $10.6 billion annually [2]. Alternatively, direct costs to the healthcare system such as inpatient costs, clinician inpatient costs, drug/prescription costs, and physician office visits are estimated to cost a total of $60.2 billion annually [2]. Readmissions of patients due to HF were reported to cost $17.4 billion to the Medicare program in 2004 [3].

The Affordable Care Act in 2013 created the Hospital Readmission Reduction Program (HRRP) to encourage health systems to reduce readmissions and curb healthcare expenditures. This policy enables the Centers for Medicare and Medicaid Services (CMS) to reduce reimbursements to hospitals that have high rates of 30 day readmission for specific disease states [4]. In 2015, CMS planned to reduce reimbursement by 3%, if 30-day readmissions were considered excessive [4]. As a result, hospitals have aggressively monitored 30-day readmission rates as a metric for the quality of patient care delivered. Furthermore, in an effort to

maximize reimbursement and reduce penalties from excess readmissions, institutions are implementing programs that focus on reducing readmissions within 30-days of discharge from the hospital.

One strategy that is commonly used by hospitals to reduce readmissions is inpatient or discharge counseling education [5]. As members of large, multidisciplinary teams, pharmacists are able to provide services such as medication reconciliation, chart reviews, and patient education [6]. The use of pharmacists for discharge counseling in recent models has shown a varied improvement in 30-day all-cause readmissions for patients with a HF diagnosis [7-11].

Six recent studies examined pharmacy interventions on readmission rates in HF patients. A single center retrospective study of a continuum of care transition service found a significant lower 30 day readmission rate (intervention=164, control=470, 12.3% vs. 23.8%, p = 0.005) [10]. The results from a pharmacist-led quasi-experimental design study found a significant difference in 30-day all cause readmissions (intervention = 35, control = 115, 17% vs. 38%, p = 0.02) [9]. Another pharmacist facilitated quasi-experimental study reported no significant difference (intervention = 358, control = 366, 22.1% vs. 18%, p = 0.17) [11]. A nonrandomized intervention study of student and resident led counseling found no statistically significant difference in 30-day HF readmission rates (intervention = 86, control = 94, 11.1% vs. 8.1%, p = 0.52) [8]. In a 6-month prospective pharmacy resident led study, 30-day HF readmission rate decreased from 28.1% to 16.6% [7]. Finally, a case report found that a pharmacy-led transition of care program decreased 30-day all-cause readmission rates (17% in 2011 to 15% in 2013) [12]. Due to the lack of homogeneity in these studies, more studies are needed to confirm hospital pharmacy-counseling impact on HF readmissions.

STUDY RATIONALE AND OBJECTIVES

Study Hospital is an 819-bed acute care teaching hospital located in an urban setting. In beginning of August 2014, the study hospital pharmacy department started a discharge counseling service program specifically to educate HF patients in an effort to reduce readmission rate and costs to the hospital, thereby maintaining current reimbursement rates. A baseline evaluation of the study hospital's program is needed to be able to compare with earlier findings from studies conducted in other states (Michigan, Massachusetts, etc.) and plan future refinements of the program at the study hospital Therefore, the authors proposed a retrospective study to evaluate the association of pharmacy student or pharmacy resident discharge counseling service with 30 day all-cause readmission in patients discharged with a billable HF code at the authors' institution.

METHODS

Setting

The current retrospective observational study was conducted based on data collected from the counseling patients on the nursing floors at Hartford Hospital. Patients were eligible to be counseled in this study if they were admitted for suspected HF from August 2014 to July 2015 and were at least 18 years of age. Patients were excluded if they were located on the step down or intensive care units, and if they were older than 87 years of age. In the months of April, May, and July 2015, students were not available to counsel patients. Therefore, any visits during those 3 months were excluded. Only visits that resulted in a final discharge billing code for HF were included in the final analysis. The study hospital's institutional review board approved the use of the de-identified data for the retrospective study as "research not involving human subjects".

Intervention

Pharmacy residents identified appropriate patients on a daily basis using the institution's inpatient electronic medical record (EMR). The EMR was used to print a pre-developed report called 'Patients with CHF Diagnosis,' which only included inpatients at Hartford Hospital with a HF diagnosis code.

After patients were identified, the pharmacy resident instructed Advanced Practice Pharmacy Experience (APPE) students to provide counseling to the patients. Consultation occurred Monday through Friday (non-holiday, business days) during months that APPE students were on rotation at Hartford Hospital. In general, students were assigned 1 to 2 patients a day. All patients in intensive care units or on step-down units were excluded due to assumed acuity of care and dynamic medication management. Patients were also exluded if they were admitted for a ventricular assist device (VAD) or heart transplant. Patients were then chosen based on nursing floor. All identified patients on cardiology/HF nursing unit were counseled first, followed by cardiology, and cardiothoracic surgery patients and then the remainder of the hospital.

All APPE students received an orientation to the program. The orientation included training resources for providing patient education: (1) a pharmacy developed and hospital approved handout on commonly prescribed medications, (2) a "How To" on counseling HF patients, and (3) a summary of common medications, their side- effects, typical dosing schedule, reason for use, and common pearls. A major requirement for counseling was identifying definitive or potential non-adherent patients. If identified, students were asked to propose opportunities to improve adherence (cell phone reminders, pill boxes, etc.). Finally, it was requested that students have patients verbalize why they were on specific medications and their importance.

Students were required to observe a licensed pharmacy resident educating an identified HF patient, and were then observed educating by the same resident. Students were able to educate independently after they received approval from the supervising pharmacy resident.

Study variables

The overseeing pharmacy resident coordinating the program during that month was responsible for recording the data in an Excel spreadsheet. The spreadsheet included the name of the patient, medical record number, patient floor, admission and discharge date, date of education, name of the educator, and comments if the patient was unable to be counseled. All aspects of the program were coordinated via email, by which students would communicate whether they counseled a patient or not. If they did not counsel a patient, they were asked to provide a reason (e.g., non- English speaking, absent for a procedure, discharged).

The intervention group consisted of patients who received counseling as described previously. The control group consisted of patients discharged within the same time period as the intervention group, but was unable to be counseled by a pharmacy student or pharmacy resident. This group was identified using *International Classification of Diseases, Ninth Revision* (ICD-9) codes retrospectively through the use of a hospital 30-day readmissions database. Additional data collected include patient's demographic information, hospital length of stay (days), time from discharge to readmission (days), the number of co- morbidities, English as a primary language (yes, no), and time counseled to discharge (days).

Statistical analysis

All statistical analyses were conducted using SAS Version 9.4 (SAS Institute Inc, Cary, North Carolina). Patient characteristics for both the intervention and control groups were described by reporting the median and range for continuous variables and proportions for categorical variables. Statistically significant differences were reported using the NAPR1 WAY Wilcoxon analysis for continuous variables with non-normal data and categorical variables using the fisher's exact test. Bivariate (unadjusted) and multivariate (adjusted) analyses was carried out using logistic regression to study the association of counseling intervention with the readmission outcome variable defined as "at least one 30-day readmission". In the multivariate logistic regression analyses, patient characteristics significantly associated with readmission in bivariate analyses were included. A *P* value of less than 0.05 was considered statistically significant for all analyses.

RESULTS

Three hundred and sixty-two patients (intervention, n = 130; Control, n = 232) met the criteria to be included in the study **(Appendix 1). Table 1** show that the baseline characteristics were similar between the two (intervention and control) groups except gender, length of stay, race and English as a primary language. For both groups, patient age was 77 years (mean), and the median number of co- morbidities was 5 (ranging from 1-11). More patients in the intervention group were male (63% vs. 43%), Caucasian (77% vs. 68%), spoke English as a primary language (97% vs 85%) and had a longer median length of stay (7 days vs. 5.5 days).

Table 1. Patient characteristics by counseling intervention.

Characteristics, n (%) unless otherwise specified*	Intervention (n=130)	No Intervention (n=232)	P-value**
Age*	77 (48-87)	76.5 (30-87)	0.39
Sex, male	82 (63%)	100 (43%)	**<0.001**
Race			**0.01**
White	100 (77%)	157 (68%)	
African American	16 (12%)	25 (11%)	
Hispanic	6 (5%)	37 (16%)	
Other	8 (6%)	13 (5%)	
English as Primary Language (Yes)	127 (97%)	197 (85%)	**<0.001**
Co-morbidities*	5 (1-11)	5(1-11)	0.51
Length of Stay*	7 (2-51)	5.5 (1-76)	**0.002**
Time from discharge to readmission	15 (1-29)	16 (1-30)	0.30

*Median (range), **p<0.05, statistically significant

Table 2 demonstrates that patients who were readmitted versus who were not readmitted also had significant differences for all baseline characteristics except in gender and co-morbidities. In univariate logistic regression analyses, the intervention group patients were significantly less likely than the control group to be readmitted at least one time within 30-days after discharge (unadjusted Odd ratio (OR): 0.59, 95% Confidence Limits (CL) = 0.37-0.92; p = 0.02, data not shown).

Table 3 shows that in multivariate analyses, after adjusting for age, gender (female vs. male), race, English as a primary language (yes vs. no), and median hospital length of stay; the intervention group patients were still significantly less likely than the control group to be "readmitted at least one time" within 30-days after discharge (adjusted OR = 0.54, 95% CL = 0.32-0.91, p = 0.0207).

Table 2. Patient characteristics by readmitted status.

Characteristics, n (%) unless otherwise specified*	Readmitted (n=143)	Not Readmitted (n=219)	P-Value**
Age*	72 (30-87)	79 (65-87)	**<0.001**
Sex, male	81 (57%)	101 (46%)	0.05
Race			**<0.001**
White	88 (62%)	169 (77%)	
African American	19 (13%)	22 (10%)	
Hispanic	29 (20%)	14 (6%)	
Other	7 (5%)	14 (6%)	
English as Primary Language (Yes)	121 (85%)	203 (93%)	**0.02**
Co-morbidities*	5 (1-11)	5 (1-11)	0.97
Length of Stay *	7 (1-76)	6 (1-37)	**<0.001**

*Median (range), **p<0.05, statistically significant

Table 3. Patient characteristics accociated with readmitted status.

Characteristics	Adjusted Odds Ratio+ of being Readmitted (n=143) versus Not Readmitted (n=219)	95% Confidence Limits		P-Value
		Lower Limit	Upper limit	
Counseling Intervention (yes vs. no)	0.54	0.32	0.91	**0.0207***
Age, years	0.92	0.90	2.03	**<0.001***
Gender (Female vs. Male)	0.61	0.38	0.99	**0.0445***
Race (Other vs. Caucasian White)	1.13	0.63	4.25	0.6867
English as Primary Language (yes vs. no)	1.84	0.80	0.95	0.1517
Length of Stay, days	1.07	1.02	1.12	**0.0037***

*P<0.05 is statistically significant

+Adjusted Odds Ratio of being “readmitted versus not readmitted" at least one time within 30-days after discharge

A total of 37 students and 5 residents performed the counseling in the intervention group. Out of the patients who did not receive counseling, educators reported the reasons for 23 patients. The reasons were as follows: unavailable (9 patients), sleeping (5 patients), health condition (4 patients), language barrier (4 patients), and refused counseling (1 patient).

DISCUSSION

The pharmacy student and resident HF discharge program demonstrated that patients who received counseling were significantly less likely to have at least one 30-day all cause readmission. The observed outcome in the current study is similar to previous studies [7,9,10,12,13]. The current study supports and adds to previous evidence where pharmacy discharge counseling has made an impact on patient care.

Reducing readmission rates can be influenced by multiple factors such as stage of HF, race, co-morbid conditions, individual patient’s risk for readmission and other factors. This could explain why similar studies have reported varied results with pharmacy discharge counseling in HF. For example, the current study findings were different from one study that found no statistically significant difference in 30 days HF readmission rates between patients who received compared to those who did not receive pharmacy student and resident-led discharge counseling service [8]. Additionally, the current study findings are similar to the other study [8] because pharmacy residents and pharmacy students carried out the discharge counseling intervention. The studies differed in the primary outcome measure as the current study observed 30-day all cause readmissions while the former study observed 30 days readmissions specifically for HF [8]. Further, the previous study had a younger population with mean of 71 years of age and measured other outcomes such as readmission risk and cost avoidance. The current study is unique in that it is the only one to examine variables such as time from discharge to readmission, English as a primary language, and reasons for not counseling, which have not been studied before [8].

In this study, the intervention group compared to the control group was more likely to be of Caucasian race, of male gender, speak English as a primary language, and have a longer length of stay **(Table 1)**, whereas the previous study had no significant differences in baseline characteristics [8]. The differences in demographic characteristics of intervention and control group patients could have influenced the risk for readmissions, as the same characteristics were also significant for patients who were readmitted (shown in **Table 3**).

Although reasons were reported only in 27 patients of the "not counseled" group; the two most common reasons that the patients did not receive counseling were because they were unavailable or sleeping. Based on the study findings, future studies at the study hospital could consistently document the reasons for not counseling for each eligible patient to be able to design future counseling programs considering these reasons. Finding solutions to overcome these reasons (barrier to accessing the programs because of English not being patient's primary language) can improve the design and outcomes of future pharmacy discharge counseling education programs.

LIMITATIONS

There are several limitations to the current study. First, the authors were unable to include patients who had HF in the months that students were not available. Second, the database can only record 30 days readmission to the study hospital, which could miss patients readmitted within 30 days to other institutions. Third, for purpose of feasibility, counseling education program were prioritized to one particular floor before moving on to other areas of the hospital. Therefore, excluding patients in the ICU and step-down units could have affected the study results which may be conservative because the patients in these units may be sicker and more likely to be readmitted. Fourth, although the data were recorded by residents to the best of their ability, checking for errors in the previously recorded data were beyond the scope of the study. Fifth, even though the numbers of co-morbidities were similar between patient populations, severity of specific disease states could have made a difference and have influenced the study findings. Sixth, previous studies also found that discharge counseling improved patient satisfaction and cost avoidance. [8] The current study was unable to evaluate outcomes (patient satisfaction and hospital costs) and control for other patient characteristics such as disease severity, and risk for readmission, because these data could not be collected due to limited resources. However, future research at the study hospital could focus on all these aspects related to hospital pharmacist discharge counseling.

CONCLUSIONS

Heart Failure patients who received pharmacy student and or resident counseling were significantly less likely to be readmitted compared with patients who did not receive discharge counseling. To avoid increasing penalties from CMS for excess readmissions, hospitals could consider implementing, evaluating and refining a pharmacy discharge service involving both pharmacy students and residents which may be a reasonable option. However providers and payer implementing the discharge counseling service need to reach female, non-english speaking, other race patients, and those with short length of stay.

The current study adds to the literature on the topic and expands literature on the current Northeastern hospital. Despite limitations, the study demonstrated missed opportunities for discharge counseling in heart failure patients that warrants the attention of providers and payers. The current study findings being the first evaluation of the service can help in the future redesign of the pharmacy discharge counseling programs or services at the study hospital. Consequently, using available resources; elderly patients, non-English speakers, and females, and patients with short length of stay could also have equal opportunity to receive the pharmacy resident and student discharge counseling service. Further, like earlier reports, the current findings also provides baseline information for the study hospital on a valuable delivery model of hospital discharge counseling because it can not only reduce patient's hospital costs from decreased readmissions but also save costs of employing a staff pharmacist (vs. using "pharmacy students and residents") to educate patients.

Thus, the current study will provide baseline information for providers, payers, and researchers to evaluate discharge counseling service programs in their own practice settings. Importantly, the pharmacy students and residents are able to practice their clinical skills and engage in real-world patient centered delivery of discharge counseling services to reduce readmissions. The current study will also help the study hospital stakeholders adapt these methods for routine real-time evaluations of the service programs as they redesign the programs in the future. Discharge counseling service need to reach female, non-English speaking, other race patients, and those with short length of stay.

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AUTHORSHIP

Concept and design (JS, SD, SM, NT); acquisition of data (NT, SD, SM, JS) and analyses of data (JS); interpretation of data (JS, SD); drafting of the manuscript (SD, JS); and critical revision of the manuscript for important intellectual content (JS, SD, SM, NT)

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Appendix 1: Summary of study group selection