

Lessons Learned in The Evaluation of Hospital Admissions for Patients with Heart Failure Seen by a Pharmacist in Addition to a Nurse Practitioner, Compared to a Nurse Practitioner Alone

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In 2014, heart failure admissions were estimated to cost the United States' health systems more than 11 billion dollars.¹ National initiatives such as the Hospital Readmissions Reduction Program and health-system specific interventions have emerged to reduce the frequency and cost of these admissions. One such initiative that has gained popularity in recent years is the addition of pharmacists to the care of patients with congestive heart failure (CHF) in ambulatory settings. Pharmacists can perform a variety of services in these ambulatory settings, including providing disease state, pharmacologic, and non-pharmacologic management and monitoring, performing medication histories, and providing medication recommendations to clinic providers.

Previous studies have evaluated pharmacist involvement in the care of CHF patients.²⁻⁷ Many of these studies focus on pharmacists independently, or collaboratively meeting with CHF patients who have recently been discharged from the hospital to provide disease and medication-specific information, titrate medications to optimal doses, and perform medication histories. These studies suggest that pharmacist involvement decreases emergency room visits, decreases hospitalizations, and increases medication adherence. Focusing on heart failure admissions, one systematic review and meta-analysis of 12 studies including 2060 patients found that pharmacist involvement in the care of CHF patients significantly lowered all-cause (OR 0.71; 95% CI 0.54-0.94) and heart failure-specific hospital

Abstract

Objective: Compare hospital admission rates for patients seen by a pharmacist in collaboration with a nurse practitioner, versus a nurse practitioner alone.

Methods: Two evaluators collaborated in a retrospective chart review of patients with congestive heart failure (CHF) who were seen in an outpatient cardiology clinic. The first evaluator selected 40 patients: 20 who saw a nurse practitioner (NP) and a pharmacist (RPh), and 20 who saw an NP alone. The evaluator matched the groups according to a heart failure admission risk score. A second evaluator, who was blinded to the groups, performed the data collection and analysis. The primary outcome was the number of hospital admissions at 30, 60, and 90 days post-cardiology clinic visit. A two-tailed student's t-test was used to detect statistically significant differences in the number of all-cause admissions between the two groups, with a p-value of less than 0.05 considered significant.

Results: The number of hospital admissions was lower in the RPh+NP group compared to the NP-only group at 30 (2 admissions RPh+NP vs. 4 admissions NP; p=0.389), 60 (4 admissions RPh+NP group vs. 5 admissions NP; p=0.714), and 90 days (4 admissions RPh+NP vs. 7 admissions NP; p=0.300) post-cardiology clinic visit, but not statistically significantly different for any of the time points evaluated.

Conclusions: Although not statistically significant, there were fewer hospital admissions in the interdisciplinary group compared to the NP-only group, which could support an expansion of pharmacist services in the outpatient cardiology clinic.

admissions (OR 0.69, 95% CI 0.51-0.94) compared with the control group.² Two smaller studies also found favorable effects, including at least a 50% reduction in hospitalizations after patients established care in ambulatory settings with a clinical pharmacist.^{3,4}

Despite primarily positive findings in

the literature, pharmacist expansion in ambulatory cardiology clinics has been slow. At the institution where this study was conducted, pharmacists are only allotted 0.125 full-time equivalents (FTE) to staff in the cardiology clinic, which equates to one day a week, every other week. The workflow in the clinic is drastically different

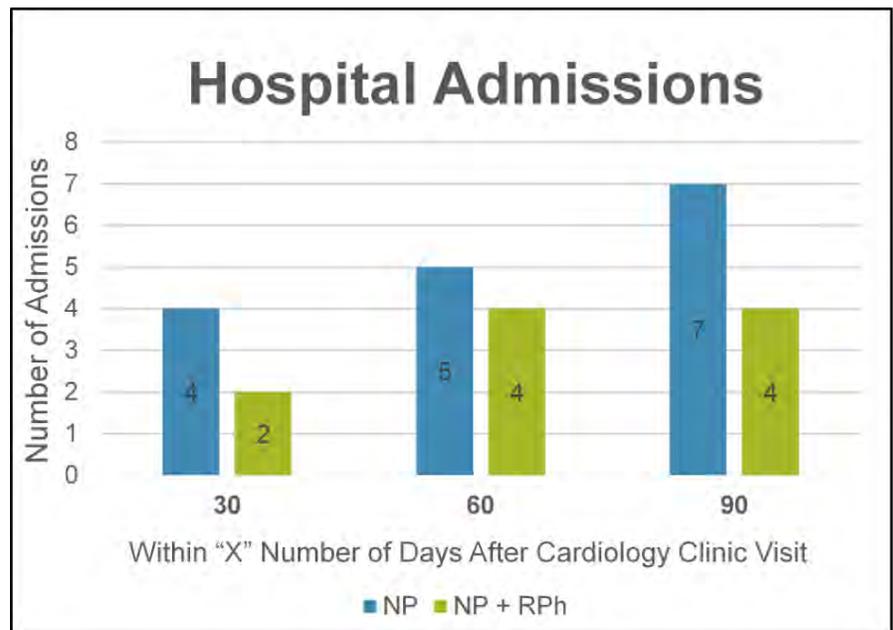
when the pharmacist is present compared to when the pharmacist is absent. The appointment length remains 30 minutes regardless of whether the pharmacist is present in clinic, but when the pharmacist is present, the pharmacist sees the patient first, performs a medication history, provides medication and lifestyle-specific education, and then verbally hands off their findings to the nurse practitioner (NP). When absent, the patient only sees the NP, and less time is devoted to medication-specific information. The purpose of this evaluation is to compare 30-, 60-, and 90-day hospital admissions between patients who see both the pharmacist (RPh) and the NP, versus the nurse practitioner alone. If the data supports it, next steps could include expanding the pharmacist FTE in the cardiology clinic.

Methods

Design

Two evaluators were involved in the data collection and synthesis of this retrospective chart review. The first evaluator selected patients for enrollment. To be eligible, patients had to have a diagnosis of CHF, and had to have been seen in the cardiology clinic between January and May 2020. Any patient with a diagnosis of CHF was eligible for inclusion, regardless of their ejection fraction being considered reduced (ejection fraction less than 40%), or preserved (ejection fraction greater than 50%). A total of 40 patients were selected (to reach 20 patients per group). Because admissions were evaluated through 90 days, patients in the RPh+NP group were selected in reverse chronological order by selecting patients who reached 90 days out from their cardiology clinic visit and then continued back in time to reach a total of 20 patients. Each of these 20 patients were scored based on heart failure admission risk, using a score that is calculated in the electronic medical record. This calculated score provides an estimated 1-year risk of being admitted to the hospital for heart failure, and ranges from 1% to 12%. The score defines a risk of 1-3% as low risk of admission, 4-9% as moderate risk, and 10-12% as high risk. To create groups with similar admission risk and thereby reduce the likelihood of confounding variables, the other group was selected to have admission risk scores that matched the first group (6 low, 12 medium, and 2 high risk patients respectively).

FIGURE 1. Number of Hospital Admissions 30-, 60-, and 90 days After Cardiology Clinic Visit for Nurse Practitioner Only versus Nurse Practitioner and Pharmacist Groups



NP = Nurse Practitioner; NP + RPh = Nurse Practitioner and Pharmacist

Patients were excluded if they were deceased within 90 days of the visit, did not have a risk of heart failure admission score, or were selected for the NP-only group but met with a pharmacist within the previous year of their visit date. The other evaluator, who was blinded, conducted the retrospective chart review and documented the number, dates, and reasons for admission for each patient. Reasons for admission were documented and evaluated by consensus by the two evaluators to determine if they were elective versus non-elective procedures. Elective procedures (e.g. colonoscopies) were omitted from the final data as the intent of the evaluation was to reduce unintentional hospitalizations. All pharmacists who saw patients in the cardiology clinic had their Doctor of Pharmacy (PharmD) degrees, but no additional ambulatory care training.

Data Analysis

A two-tailed student's t-test was used to detect statistically significant differences in the number of admissions between the group seen by the RPh+NP versus the NP alone for 30, 60, and 90 days after cardiology clinic visits. A p-value of less than 0.05 was considered significant. This study was exempt from institutional review board (IRB) approval because it was a retrospective chart review.

Results

The number of hospital admissions was lower in the RPh+NP group compared to the NP-only group at 30 (2 admissions RPh+NP vs 4 admissions NP; $p=0.389$), 60 (4 admissions RPh+NP group vs 5 admissions NP; $p=0.714$), and 90 days (4 admissions RPh+NP vs 7 admissions NP; $p=0.300$) post-cardiology clinic visit, but not statistically significant for any time point evaluated (Figure 1). One patient underwent an elective colonoscopy during the study period from the NP only group, which was excluded from the final analysis. No patients were admitted multiple times during the study period.

Discussion

Comparison To Other Studies

The reduction in hospital admissions in the RPh+NP group compared to the NP alone group was approximately 43% by the end of the study. This is similar to previous studies that showed approximately a 50% reduction in hospital admissions with the addition of a pharmacist in this setting.^{3,4} The results of this trial may be used to expand the FTEs of the pharmacist in the cardiology clinic. Furthermore, it can add to the growing literature that demonstrates the benefit of the addition of pharmacists to ambulatory cardiology clinics and other primary care settings.

Limitations

There are several limitations of this evaluation. First, this evaluation was not randomized, which could have introduced bias. Attempts were made to limit bias by blinding the evaluator who performed the chart review, although it is possible the evaluator inadvertently saw notes in the chart that may have indicated which group the patient belonged to. Second, hospital admissions may have been missed if patients sought care outside of the facility where the evaluation was conducted (and that facility did not communicate via Epic's Care Everywhere functionality). Third, patients were matched between the two groups based on a risk of heart failure admission score. Although this score might have created similar admission risk for heart failure-specific admissions, the primary endpoint of this evaluation was all-cause hospital admissions. The decision to choose all-cause hospital admissions was twofold. Much of the available literature reports all-cause admissions and not heart failure-specific admissions, which would allow comparisons to similar studies. Second, the health system tracks quarterly heart failure admissions (which are classified as admissions within 30 days for any reason, except for scheduled elective procedures). Therefore, to prove a benefit of the pharmacist in the cardiology clinic at an institutional level, the investigators chose a variable that closely matched what would be evaluated by the health system. Lastly, the results of this evaluation are likely only applicable to low- or medium-risk patients, because patients who were deceased within 90 days were excluded (likely the patients with the most advanced disease), and only two high-risk patients were included in each group at baseline.

Choice Of Statistical Test

The initial trial design was to use Fisher's exact test to determine if there was a statistically significant difference in the percentage of patients admitted versus not admitted in each of the groups. After realizing the potential for multiple admissions during the study period, the decision was made to switch to the student's t-test to evaluate the difference in the number of admissions between the two groups. Although no patients were admitted multiple times during the evaluation period,

future evaluation would benefit from using the student's t-test to evaluate similar data to account for multiple admissions.

Conclusions

The addition of a pharmacist to an outpatient cardiology clinic may reduce hospital admissions through 90 days post-cardiology clinic visit. Future studies could evaluate the effect on hospital admissions for longer durations (e.g. 6 months to 1 year), and with larger sample sizes. Ideally, a randomized trial could be conducted to minimize selection bias in future studies.

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