Impact of Clinical Pharmacist Interventions on 30-Day Readmission Rate in Hospitalized Patients With Acute Myocardial Infarction

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Abstract

Background: Limited literature exists on the positive impact of pharmacists specifically on hospital readmission of patients with acute myocardial infarction (AMI). **Objective:** To evaluate the overall effect of clinical pharmacist interventions on preventing hospital readmissions and improving the health of patients with AMI. Secondary objectives include identifying trends in the demographic characteristics of AMI patients, identifying potential barriers to adherence, and assessing the average time spent by a pharmacist counseling AMI patients. **Methods:** This prospective, nonrandomized, single-center study was approved by the institutional review board. The hospital's 30-day AMI readmission rate prior to study initiation was used as the control group. An AMI report was generated daily to identify patients admitted to the hospital diagnosed with either non-ST or ST segment elevation myocardial infarction. The clinical pharmacist then counseled the included patient prior to discharge and provided a follow-up phone call 48 hours after discharge. The primary outcome was the all-cause 30-day readmission rate for AMI patients. **Results:** Out of 71 patients screened, 50 patients were included in the study. Only 3 of the 50 patients included were readmitted (6.0%). The prestudy rate from October 2012 to October 2013 was 11.6%, or 58 readmissions out of 498 AMI admissions. Although the study group was much smaller in size, a 6% readmission rate is encouraging and offers potential for a future intervention. **Conclusion:** Clinical pharmacist services for AMI patients, including counseling, interventions, and a follow-up phone call after discharge, may benefit decreasing the 30-day AMI readmission rate; however, further studies are needed.

Keywords

cardiology, clinical pharmacy, counseling, myocardial infarction, pharmaceutical care

Background

Acute myocardial infarction (AMI) in the United States has an estimated annual incidence of 515 000 new attacks and 205 000 recurrent attacks.¹ Although advances in treatment have decreased the number of deaths due to AMI, a large number of AMI survivors are being dismissed from the hospital into the community and are at risk for readmission.^{2,3} Many factors may affect early readmission rates for AMI including comorbidities, environmental factors, insufficient discharge planning, nonadherence to medication therapy, and a reduced level of health literacy.⁴ Heart failure, renal disorders, and pneumonia are 3 common readmission diagnoses following AMI, with heart failure being the most common.⁵

Acute myocardial infarction has been identified by the Medicare Payment Advisory Commission as a common, costly cause of hospitalization, with a high proportion of potentially preventable readmissions.⁶ In October 2012, the Patient Protection and Affordable Care Act allowed the

Centers for Medicare and Medicaid Services to begin penalizing hospitals with readmission rates greater than the national average for AMI, heart failure, and pneumonia.⁷ As a result, 30-day readmission rates have become key quality outcome measures for most hospitals.

Clinical pharmacists can help reduce hospital readmission rates. Pharmacists have the training and expertise needed to provide medication-related education and to resolve medication-related problems at discharge, which may reduce preventable adverse events, hospital readmissions, and visits to the emergency room.⁸ Schnipper et al⁹ demonstrated that pharmacist medication review, patient

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counseling, and telephone follow-up were associated with a lower rate of preventable adverse drug effects 30 days after discharge. Warden et al¹⁰ demonstrated that pharmacist involvement in medication reconciliation and discharge counseling for heart failure patients was associated with a significant reduction in 30-day all-cause readmissions. Axtell et al¹¹ reported positive outcomes concerning the impact of a pharmacist's participation in improving adherence to national treatment guidelines for patients with AMI. Literature does not exist specifically on the positive impact of pharmacist interventions on the readmission rate of patients with AMI. The purpose of this investigation, therefore, was to contribute to the literature by evaluating the overall effect of clinical pharmacist interventions, including medication review, counseling, and follow-up, on preventing readmissions and improving the health of patients with AMI.

Methods

This prospective, nonrandomized study was conducted from November 1, 2013, through January 31, 2014, at a 435-bed community hospital. The study work was conducted in adherence with the requirements of the study site's institutional review board. All screening, counseling, and clinical pharmacist interventions were performed by the principal investigator, a pharmacy resident. The hospital's 30-day AMI readmission rate prior to the study for month ending October 2013 (11.6%) was used as the historical control group. This prestudy readmission rate was a 12-month, rolling average from October 2012 through October 2013.

For the prospective study group, a report was provided daily, Monday through Friday, to identify patients admitted to the hospital with a diagnosis of AMI, including non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI). This report was generated and updated by the Chest Pain Coordinator, who added patients based on elevated troponin levels and documentation in the medical record of NSTEMI or STEMI diagnoses. Patients were enrolled in the study if they were 18 years of age or older and diagnosed with either an NSTEMI or STEMI. Patients with a planned discharge to a long-term skilled nursing facility, patients transferred to other medical units due to changing diagnosis, patients with dementia or other severe psychiatric illness, or patients who were prisoners were excluded. Written consent was required from all patients included in the study.

Patient medication education was a major component of the clinical pharmacist's intervention. The clinical pharmacist provided verbal counseling to the study patients as well as addressed and documented the following points: generic names of medications, indications, dosages/frequencies, adverse effects, medication adherence, reinforcement of physical activity (if applicable per physician), reinforcement

of alcohol limit (if applicable per physician), smoking cessation (if applicable), and cost concerns. Counseling took place prior to the patient's discharge from the hospital, but not necessarily the day of discharge. The teach-back method was employed to assess the patient's understanding of the counseling session. This method included requesting that the patient repeat important points conveyed to him/her and then documenting whether the patient could teach back or needed reinforcement. The last step of the intervention included a follow-up phone call by the clinical pharmacist to the patient within 48 hours of discharge to address adherence, issues with access to discharge medications, as well as any questions the patient might have had regarding the medications. Patients were called a minimum of 2 times with a voicemail left on the second try if the patient had voicemail. Thirty days after the patient had been discharged, the primary investigator reviewed the chart to determine if the patient had been readmitted.

Data Collection

De-identified patient data were collected from medical chart reviews and patient interviews. Types of data that were collected included patient diagnosis, patient demographic information including history of cardiac comorbidities, discharge medications and dosage, utilization of a translator, patient cost concerns, counseling performed and time, teach back outcome, the number of discharge medications the patient went home on, and if the patient was reached with the follow-up phone call. Clinical pharmacist interventions were also documented including counseling, identification of inappropriate therapy, dosage or frequency adjustment, over-the-counter drug product recommendation requests, prevention of medication errors, monitoring for signs and symptoms of bleeding, patient cost savings, laboratory monitoring, identification of missing therapy, and identification of adverse effects of medications. For the readmitted patients, their admitting diagnosis for readmission was also documented.

Outcome Measures

The primary outcome measure was all-cause hospital readmission at 30 days. Secondary endpoints included the incidence of clinical pharmacist interventions on medication cost optimization, utilization of translators for patients with a language barrier, and the average time spent by a clinical pharmacist counseling AMI patients.

Statistical Analysis

Demographic data were calculated as means, percentages, and standard deviations using GraphPad (QuickCalcs Software, Inc). All statistical analysis was performed in Gastonia, North Carolina.

Table 1. Baseline Characteristics for Study Group (N = 50).

Patient Characteristic	n (%)
Age (year) ^a	62 ± 14
Weight (kg)	96
Height (in.)	69
BMI ^a	33 ± 9
Male	33 (66)
Race	
African American	5 (1)
Caucasian	43 (86)
Hispanic	2 (4)
Language	
English	49 (98)
Spanish	1 (2)

Abbreviation: BMI, body mass index.

^aMean ± standard deviation.

Table 2. Patient History of Cardiac Comorbidities (N = 50).

History of Cardiac Comorbidities	n (%)
Coronary artery disease	21 (42)
Diabetes mellitus	24 (48)
Heart failure	2 (4)
Hyperlipidemia	28 (56)
Hypertension	29 (58)
Myocardial infarction	6 (12)
Renal dysfunction	5 (1)
Smoking (past or current)	24 (48)

Results

Out of 71 patients screened for the study, 65 patients were included. Six patients were excluded due to not coding out as NSTEMI or STEMI. Of the 65 patients who met inclusion, 11 patients were missed, 4 patients refused to sign the written consent, and 50 patients agreed to participate in the study. Out of 50 patients, only 4 of the study patients were not reached for the follow-up phone call.

In reference to the primary outcome, 3 of the 50 patients (6%) in the study group were readmitted to the hospital within 30 days of discharge. The hospital prestudy readmission rate, which was taken from October 2012 to October 2013, was 11.6%,¹² or 58 readmissions out of 498 AMI admissions.

Trends in the demographic characteristics and cardiac comorbidities were identified. Study group participants on average were younger than 65 years of age, obese as defined as having a body mass index greater than 30,¹³ male, and English speaking (Table 1). The most common cardiac comorbidities included hypertension, hyperlipidemia, diabetes, and smoking (Table 2).

Medication cost could not be labeled as a barrier to adherence for this patient population. Although 34% of

patients in the study group expressed concern with the total cost of their medications, only 1 of the 3 patients readmitted had documented cost concerns. Out of 17 total interventions, only 1 intervention related to medication cost was documented.

Language was also not an issue for this predominantly English-speaking patient population. Only 1 translator was necessary out of 50 patients. All 3 readmitted patients spoke English as their primary language.

In reference to the average time spent by the clinical pharmacist counseling study patients, the time was assessed at 12 minutes per patient, ranging from 5 to 20 minutes. This time does not include interventions or the follow-up phone conversation.

One potential barrier that was not included on the original study protocol but emerged during this study was polypharmacy. The average number of discharge medications for the study group was 11, and the average number of discharge medications for the patients readmitted was 12.

An interesting finding from this study was a trend in pharmacist interventions toward medication safety. Out of 17 interventions, 14 interventions were related to medication safety, including identification of inappropriate therapy and preventing medication errors. Of the remaining 3 interventions, 2 interventions were related to service, such as providing over-the-counter drug recommendations per patient request, and 1 intervention was related to medication cost as noted above.

Discussion

The 3 patients that were readmitted in the study group had 4 characteristics in common. They were characterized as obese with a body mass index greater than 30. All 3 patients had greater than 8 medications on discharge; therefore, polypharmacy and medication adherence could have been an issue. Also interesting to note, all 3 patients were documented as being able to teach back the important points of counseling that the pharmacist touched on. Finally, all 3 patients were readmitted due to cardiac issues including coronary atherosclerosis, diastolic heart failure, and stent thrombosis. Since the readmitted group was small, further investigation should be done in a larger population to address significant commonalities.

This study showed that clinical pharmacist interventions in a group of 50 hospitalized patients with AMI produced a low readmission rate of 6%. This finding is encouraging since the current, reported national average readmission rate is 19.7%.¹² These positive results are similar to findings in other studies involving pharmacist interventions with cardiac patients. Gattis et al¹⁴ reported a significant impact of pharmacists on nonfatal heart failure events and mortality with a reduction in hospitalization and emergency room visits as the major contributor to the primary endpoint.

O'Dell and Kucukarslan¹⁵ did not demonstrate a significant pharmacist impact on 30-day cardiac-related readmission rate in the overall acute coronary syndrome population; however, the subset analysis of unstable angina patients showed significantly lower readmission rates in the study group. This study contributes to the literature by showing a pharmacist's positive impact specifically in the subset of acute myocardial patients, a subset less studied as compared to patients with heart failure in the area of readmissions.

In addition to the low readmission rate for the study group, there were also potential unmeasured benefits that arose from the study including medication adherence and patient satisfaction. Reinforcing patient medical adherence and preventing potential drug-related problems may assist in preventing unexpected readmission to the hospital. In terms of patient satisfaction, patients may enjoy having their questions answered by the clinical pharmacist as well as knowing that the pharmacist cares about their success with regard to pharmacotherapy management. Patient satisfaction not only benefits the patient but also positively affects the patient's perception of the hospital's service quality.

There were limitations to this investigation that are important to note. Since it was a single-center study, the patient population is not generalizable to all institutions. Three out of every 4 adults in the county where the study took place are overweight or obese,¹⁶ which is uncommon for many other hospital patient populations. The small study size was due to the completion of all study-related work and counseling after business hours. Also, patient randomization was not feasible and there was not a prospective control group for comparison. Last, there was a limited time frame for data collection of only 3 months.

Despite the limitations of the study, a 6% readmission rate offers encouragement for a future pharmacy service for AMI patients at the study-site institution. The short average counseling time of 12 minutes, as reported in the study, also improves its feasibility. This clinical pharmacist-run service may include medication review, counseling, and follow-up with a phone call to the patient after discharge. Utilization of pharmacy students and residents for this service, in addition to clinical pharmacists, would also help prevent an impact on pharmacist staffing. Further studies are needed to determine the significance of this type of service benefiting cost versus clinical outcomes.

Conclusion

Thirty-day readmission rates for AMI patients are increasingly gaining the attention of hospitals. Many patients who experience an AMI require significant patient education regarding new medications, life style modifications, and health improvement. Clinical pharmacist services for AMI patients, including medication review, counseling, and

follow-up, may positively affect and decrease the 30-day AMI readmission rate.

Declaration of Conflicting Interests

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