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Volume 6 | Number 3 Article 214

2015

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Laswell EM, Svelund EA, Harzler ML, Chambers KD, Chen AM. Discharge Medication Counseling and its Correlation with Reducing Readmissions for Patients with Chronic Obstructive Pulmonary Disease Exacerbations. *Inov Pharm.* 2015;6(3): Article 214. http://pubs.lib.umn.edu/innovations/vol6/iss3/10

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Discharge Medication Counseling and its Correlation with Reducing Readmissions for patients with Chronic Obstructive Pulmonary Disease Exacerbations

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This research was presented as a poster presentation at the 2013 ASHP Midyear Clinical Meeting in Orlando, Florida.

Acknowledgements: This project was funded by a research grant from the American Society of Health Systems Pharmacists Research and Education Foundation.

Keywords: COPD, discharge counseling, hospital readmission

Abstract

Objective: To determine the impact of pharmacist-provided discharge medication counseling on 30 and 90 day hospital readmissions and ED visits in patients admitted with COPD exacerbation.

Methods: A hospital-wide improvement was initiated, where COPD patients received discharge medication counseling and follow up phone call by a pharmacist. A pilot study was implemented, and data on readmission rates at 30- and 90-days were collected and compared to a hand-matched, retrospective control group that had not received discharge counseling by a pharmacist. Differences in readmission rates were analyzed using Chi-squared tests.

Results: A total of 28 patients received discharge counseling by the pharmacist and were compared to 28 retrospective patients. Differences in 30-day and 90-day readmission rates were not significant (p=1.000 and p=0.589, respectively). After thirty days, 7 (25%) intervention and 7 (25%) retrospective group patients had been readmitted. After ninety days, 11 (39.3%) intervention and 13 (46.4%) non-intervention patients had been readmitted. Since a small cohort of patients received discharge counseling, the study did not meet power.

Conclusions: Although not statistically significant, patients who received discharge medication counseling provided by a pharmacist had lower 90-day readmission rates post discharge. As regulations are implemented that penalize hospitals for readmissions that occur within 30 days of discharge, it is imperative that health care systems develop new strategies aimed at reducing readmission rates. Further studies that are adequately powered are needed to assess the impact pharmacists can have on readmission rates.

Introduction

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of 30-day readmissions among Medicare beneficiaries.[1] Hospital readmissions and emergency department (ED) visits constitute a significant healthcare expenditure that may be prevented. In the United States, 19.6% of Medicare beneficiaries are readmitted within 30 days following discharge; approximately one-third (34%) are readmitted within 90 days.[1] High readmission rates contribute to rising healthcare costs, estimated at $17.4 billion annually.[1] COPD alone accounts for more than 1.5 million ED visits and 725,000 hospitalizations annually, resulting in nearly $60 billion in healthcare costs.[8]

Under Section 3025 of the Affordable Care (ACA), the Hospital Readmissions Reduction Program penalizes reimbursement for select diagnosis-related groups (DRGs) based on readmission rates.[2] Beginning in fiscal year (FY) 2013, the policy included DRGs for myocardial infarction, heart failure, and pneumonia. With the start of FY 2015, this policy will expand to include total hip and total knee arthroplasty, percutaneous transluminal coronary angioplasty, and COPD.[2] As these regulations are implemented and this policy expands, it is imperative that healthcare systems pursue new strategies to reduce readmission rates, particularly for COPD patients who have a 30-day readmission rate of 22.6%.[9,10]

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Some components of a discharge plan can be optimized to effectively reduce readmissions. Including a nurse as a discharge advocate and a pharmacist to conduct follow-up phone interviews, significantly reduced 30-day hospital readmissions and ED visits.[3] Likewise, a respiratory outreach program that included clinical nurse specialists and physiotherapists in the plan also significantly reduced 180-day hospital and ED readmission rates.[4] Other studies have also demonstrated significantly improved readmission rates after creating a protocol-driven discharge plan in both the general medical population and COPD patients.[5-7]

For COPD patients, medication non-adherence is considered a significant contributing factor for readmissions.[9,10] Researchers evaluating the impact of discharge counseling have utilized nurses to provide medication education.[3-6] Although the nurses in these studies received training to provide medication counseling, the provision of information was limited to the education they received[3-6] and, therefore, limited the comprehensiveness of the discharge counseling provided. However, pharmacists are well-equipped to provide comprehensive medication counseling at discharge due to their extensive knowledge of medication therapy,[11,12] and a cost-effectiveness evaluation has shown pharmacist-led discharge counseling to provide cost-savings in 48% of scenarios.[13] The impact on readmissions of pharmacist-driven medication therapy management services at discharge, specifically for COPD exacerbations, has not been previously studied. Such an intervention may significantly reduce readmissions and ED visits related to COPD exacerbations by improving patient education and adherence.[12]

The aim of the present study is to determine the impact of pharmacist-provided discharge medication counseling on subsequent hospital readmissions and ED visits in patients admitted with COPD exacerbation.

Methods

Institutional Review Board (IRB) was obtained prior to beginning this study.

Intervention

A hospital-wide improvement was initiated with COPD patients at an urban community medical center during the weekdays. Due to staffing constraints, patients typically did not receive discharge counseling on the weekends. Each morning, a pharmacist would review the patients who were admitted to the hospital on the prior day for eligibility. Patients with a respiratory or cardiovascular condition-related admission were further reviewed to determine if the patients met the inclusion/exclusion criteria for discharge counseling. If eligible, patients were monitored for time of discharge and received discharge medication counseling.

Patients were deemed eligible for discharge if noted in the electronic medical record (EMR) by hospital staff. At that time, the pharmacist printed out the after visit summary (AVS) to determine the patient's new medications, which medications will be continued, and which medications the patient needs to stop taking upon discharge. The pharmacist then provided discharge counseling on each medication, specifically focusing on respiratory medications. For inhaled medications, the pharmacist utilized American College of Chest Physicians (CHEST) inhaler sheets for instruction.[14] The patient also was given the "Your Discharge Planning Checklist"[15] to assist with determining what questions they needed answered prior to discharge. If the pharmacist identified an error or patient concern which needed addressed, the admitting physician was contacted and clarifications were made as necessary. Finally, the pharmacist reviewed the importance of follow-up with the patient's primary care physician following discharge.

Post-discharge, a pharmacist called each patient 3-5 days later to follow-up regarding his or her new medications and to determine whether the patient had any problems with the medication, including side effects or cost barriers. The department tracked patients counseled in order to make sure follow-up occurred.

Data Collection

Data were collected for patients who received the hospital-wide improvement discharge counseling from April 9, 2013 through May 9, 2014 as a post-interventional pilot project through chart review. Patient demographic information (age, gender, race/ethnicity, insurance status) as well as comorbidities, smoking status, complete medication list at admission and discharge, length of stay, whether or not follow-up occurred, and 30- and 90-day readmission rates were obtained. For comparison, a group of patients were examined retrospectively. The same data were gathered as the intervention group, with the exception of the follow-up phone call. Records were examined for those patients with a primary or secondary diagnosis of COPD exacerbation from October 1, 2010 to September 30, 2012.

Inclusion/Exclusion Criteria

Inclusion criteria for both groups were: 18-89 years of age; primary admission diagnosis of (1) COPD exacerbation or acute on chronic respiratory failure with a diagnosis of COPD or (2) secondary admission diagnosis of COPD exacerbation or acute on chronic respiratory failure with a diagnosis of COPD with a primary diagnosis of a related respiratory or cardiovascular condition (pneumonia, asthma, viral upper respiratory tract infection, heart failure exacerbation); discharged to the community setting (e.g., not an extended-care facility); and English as a primary language. Patients from the intervention were only included if they were able to be contacted for the post-discharge phone call.

Exclusion criteria were: discharge to a long-term care facility or an extended-care facility, discharge or transfer to another hospital, subjects who were incarcerated, non-English speaking / English not as a primary language, inability to read and comprehend basic written English (as self-reported by patient), pregnancy, and physical or mental disability significant enough to prevent the patient from being able to directly participate in the majority of study interventions (based on the clinical judgment of the staff).

Outcome Measures

The primary outcome was readmission (ED visits and rehospitalizations) at 30 days. The secondary outcome of the study was readmission (ED visits and rehospitalizations) at 90 days.

Statistical Analyses

Descriptive statistics were calculated for patient characteristics and included frequencies and percentages for categorical variables and means and standard deviations for continuous variables. A total of 142 patients with COPD were assessed retrospectively. Researchers hand-matched two sets of retrospective patients to the intervention patients, and differences between groups were assessed. Differences in patient demographics between the retrospective COPD cohort (no discharge counseling) and the intervention group (received discharge counseling) were assessed using a Pearson Chi Square test or an unpaired t-test, as appropriate. One group had a significant difference in the number of COPD medication at discharge (p=0.001); thus, the retrospective group with no differences was utilized for analyses. Differences in readmission rates between the retrospective and the intervention groups were assessed using a Pearson Chi Square test.

The associations of gender, age, ethnicity, smoking status, number of comorbidities, presence of hypertension diagnosis, presence of diabetes diagnosis, presence of congestive heart failure diagnosis, number of COPD medications prior to admission, number of maintenance (non-COPD) medications prior to admission, number of COPD medications at discharge, number of maintenance (non-COPD) medications at discharge, and whether patients were in the intervention or retrospective group with 30-day and 90-day hospital readmissions were explored with logistic regression analysis.

An a priori level of 0.05 was used for statistical significance. All analyses were performed using IBM® SPSS v. 22.0 for Windows (Armonk, New York).

Results

A total of 28 patients from the retrospective review were successfully matched to the intervention group and utilized as the retrospective group. Most retrospective group patients were female (67.9%) and current or former smokers (100%). At completion of the study period, 28 patients received the intervention. Again, most were female and current/former smokers (see Table 1). There were no statistically significant differences between the matched retrospective and intervention groups. There were statistically significant differences between the entire retrospective cohort and intervention groups in the following areas: quantity of COPD medications prior to admission (p=0.013) and at discharge (p=0.045) as well as maintenance medications (p=0.033) prior to admission. No other differences between the entire retrospective cohort and intervention groups were statistically significant.

After 30 days (see Table 2), 7 (25%) intervention and 7 (25%) matched retrospective group patients had been readmitted. There was no significant difference between groups (p=1.000). After 90 days, 11 (39.3%) intervention and 13 (46.4%) matched retrospective patients had been readmitted. There was no significant difference between groups (p=0.589). Examining the full retrospective sample, 5 (17.9%) intervention and 46 (32.4%) retrospective group patients had been readmitted. There was no significant difference between groups (p=0.125). After ninety days, 13 (46.4%) intervention and 76 (53.5%) non-intervention patients had been readmitted. There was no significant difference between groups (p=0.492).

No variables were associated with 30-day readmissions when evaluated with a logistic regression (see Table 3). Only two variables were associated with 90-day readmissions: age and whether patients were in the prospective or retrospective group. Patients who had experienced 90-day readmissions were likely to be younger (see Table 4) and in the retrospective group (see Table 2).

Discussion

This small, pilot study assessed the association between pharmacist discharge medication counseling and readmission rates for patients with COPD in order to determine if this is an effective method of improving patient outcomes. Results showed that when a pharmacist conducted the medication discharge counseling, readmission rates for the intervention group vs. the matched retrospective at 90 days decreased by 7.1% and by 15.4% when compared to the entire retrospective group. The differences were not statistically significant; according to post-hoc power analyses, as there was insufficient power to detect statistical differences (power = 31.1%). Whether patients were in the retrospective or intervention group did increase the likelihood of 90 day readmission when examined using logistic regression. Thus, further investigation is necessary regarding the impact of the pharmacist in discharge education. The study results did show a statistically significant difference in the number of both COPD and maintenance medications between the entire retrospective cohort and intervention groups upon admission and discharge. This highlights an opportunity for pharmacist interventions to positively impact patient medication education and adherence and potentially decrease hospital readmission rates.

Other studies have shown similar outcomes with patient discharge counseling programs conducted by pharmacists, nurses, or other health professionals.[4-6] Self-management discharge education in COPD patients[16] and nurse-led discharge counseling with pharmacist follow-up in general medicine patients[3] both have effectively reduced rehospitalizations. Several studies have shown pharmacists to play significant roles in reducing medication-related readmissions by preventing adverse drug events.[12,17] In a report by Wiggins et al., pharmacist interventions in patients with heart failure demonstrated improved patient knowledge, reductions in medication discrepancies and errors, fewer hospital readmissions, and lower costs.[12] Although small in nature, this study demonstrates the potential for discharge counseling conducted by a pharmacist to reduce the number of hospital readmissions in the COPD population.

Medication non-adherence has been identified as a significant contributing factor for readmissions in both the general medical population[1,11,12] and in patients hospitalized for COPD exacerbation.[9,10] Data suggest that counseling patients before discharge reduces medication discrepancies and improves medication adherence.[12] Of the previous studies conducting discharge medication counseling, most have utilized nurses to provide education to patients about their medications.[3-5,6] Although the nurses serving as discharge advocates and transition coaches were trained to provide medication counseling for the study, the scope of information they could provide to patients about their medications was limited. Therefore, certain aspects of medication counseling, such as answering the patient's questions or accounting for a patient's specific needs relative to medication therapy, could be better addressed by a pharmacist, due to the nature and length of their education.

Pharmacists are trained to counsel patients about their medications, detect and resolve discrepancies, and screen for nonadherence and adverse drug reactions. Future studies should continue to examine the impact of pharmacist-led discharge counseling. Utilizing pharmacists to conduct discharge counseling may also provide significant cost savings to hospitals. A study by Chinthammit et al. used a cost-effectiveness decision analytic model to evaluate the cost-effectiveness of pharmacist discharge counseling on medication related morbidity in both the high-risk elderly and general US population.[13] Discharge counseling conducted by a pharmacist detected 89% of all medication errors and provided cost-savings in 48% of scenarios, with the greatest benefits found in the high-risk elderly patients.[13] Larger studies could determine the actual cost savings gained through pharmacist-led discharge counseling in the COPD population.

Limitations

There were several limitations to this study. The study was conducted in a single-center, small, Midwestern hospital in an urban setting, serving predominately low socioeconomic status patients. Results in this study population may not be generalizable to other populations. Also, the intervention sample size was small and did not meet the power needed to assess the primary outcome measure. Patients in the intervention group were only included if they could be contacted for the post-discharge phone call, limiting the sample size. Larger, adequately powered studies are needed to examine whether pharmacist-led discharge counseling is effective in reducing 30- and 90-day readmission rates. Staffing issues prevented data collection on the weekends, when many patients were discharged, and during times of lower staffing, there were no pharmacists available for discharge counseling. In order to implement pharmacist-based discharge counseling, hospitals may have to commit additional staffing. Future research should examine the cost-effectiveness of such initiatives. Lastly, researchers could not determine if patients were admitted to hospitals outside of the network, due to data limitations. Thus, the number of

readmissions in the intervention and retrospective groups may have been underestimated. Collaborative projects with all hospitals in a given area could be considered in future studies.

Conclusion

It is important to improve 30-day readmission rates, specifically in patients with chronic disease states given the new ACA reimbursement policies. COPD is the leading respiratory-related cause of death and also the most costly respiratory illness in the US.[18] Furthermore, it is a leading cause of 30-day rehospitalizations among Medicare beneficiaries, second only to heart failure.[1] As regulations are implemented that penalize hospitals for readmissions that occur within 30 days of discharge, it is imperative that health care systems develop new strategies aimed at reducing readmission rates. Pharmacist-led discharge counseling may be an effective strategy to reduce readmission rates and control costs in the COPD population.

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Table 1. Demographic and Health-related Characteristics of Participants by Retrospective versus Intervention Group

	Retrospective (N=142)	Matched Retrospective (N=28)	Intervention (N=28)	Intervention compared to all retrospective Test Statistic	Intervention compared to all retrospective p-value	Intervention compared to matched retrospective Test Statistic	Intervention compared to matched retrospective p-value
Gender N(%)				1.95[a]	0.163	0.00[a]	1.000
Male	66 (46.5)	9 (32.1)	9 (32.1)				
Female	76 (53.5)	19 (67.9)	19 (67.9)				
Age, Mean(SD)	66.17 (11.02)	63.6 (9.74)	64.0 (9.77)	0.97[b]	0.334	0.15[b]	0.881
Ethnicity, N(%)				0.72[a]	0.699	2.99[a]	0.084
Caucasian	123 (86.6)	27 (96.4)	23 (82.1)				
African American	18 (12.7)	1 (3.6)	5 (17.9)				
Arabic	1 (0.7)	0 (0.0)	0 (0.0)				
Smoking Status, N(%)				1.50[a]	0.683	0.29[a]	0.589
Former Smoker	56 (39.4)	11 (39.3)	13 (46.4)				
Current Smoker	80 (56.3)	17 (60.7)	15 (53.6)				
Never Smoked	3 (2.1)	0 (0.0)	0 (0.0)				
Comorbidities, Mean(SD)	5.27 (2.93)	4.0 (2.04)	5.0 (2.24)	0.52[b]	0.605	0.15[b]	0.097
Diseases, N(%)							
Hypertension	97 (68.3)	15 (53.6)	13 (46.4)	5.12[a]	0.023	0.29[a]	0.593
Diabetes Mellitus	50 (35.2)	9 (32.1)	9 (32.1)	0.11[a]	0.737	0.00[a]	1.000
CHF	39 (27.5)	7 (25.0)	7 (25.0)	0.08[a]	0.773	0.00[a]	1.000
COPD medications prior to admission, Mean(SD)	2.32 (1.81)	1.57 (1.48)	3.12 (1.40)	-2.57[b]	0.013	4.00[b]	<0.001
Other maintenance medications prior to admission, Mean(SD)	8.57 (5.09)	7.75 (4.84)	11.00 (5.35)	-2.22[b]	0.033	2.38[b]	0.021
COPD medications at discharge, Mean(SD)	4.32 (1.89)	4.11 (1.91)	3.56 (1.25)	2.03[b]	0.045	-1.26[b]	0.213
Other maintenance medications at discharge, Mean(SD)	10.28 (5.01)	10.14 (5.17)	12.26 (5.51)	-1.74[b]	0.091	1.47[b]	0.148

a=Pearson Chi Square value; b=t-test t-value

Table 2. Differences in Readmission Rates between the Retrospective and Intervention Groups

	All Retrospective N (%)	Matched Retrospective N (%)	Intervention N (%)	All Retrospective vs. Intervention Pearson Chi-Square Value	All Retrospective vs. Intervention p-value	Matched Retrospective vs. Intervention Pearson Chi-Square Value	Matched Retrospective vs. Intervention p-value
30 day readmissions	46 (32.4)	7 (25)	7 (25)	2.35	0.125	0.00	1.000
90 day readmissions	76 (53.5)	13 (46.4)	11 (39.2)	0.47	0.492	0.29	0.589

All Retrospective N=142; Matched Retrospective N=28; Intervention N=28

Table 3. Association of Demographic and Health-Related Variables with 30-Day and 90-Day Readmissions

Patient Characteristic	30 day readmission B (95% CI)	90 day readmission B (95% CI)
Age	0.98 (0.95-1.02)	**0.96 (0.93-0.996)**
Gender	1.26 (0.61-2.61)	0.69 (0.35-1.38)
Race/Ethnicity	1.92 (0.78-4.75)	2.55 (0.96-6.81)
Number of Comorbidities	1.16 (0.99-1.35)	1.05 (0.90-1.22)
Hypertension Diagnosis	1.63 (0.71-3.77)	1.76 (0.79-3.92)
Diabetes Diagnosis	1.23 (0.55-2.78)	0.97 (0.44-2.10)
Heart Failure Diagnosis	0.82 (0.36-1.92)	0.75 (0.32-1.71)
Number of COPD Medications Prior to Admission	1.25 (0.91-1.71)	1.25 (0.93-1.70)
Number of Maintenance Medications Prior to Admission	1.03 (0.83-1.26)	1.04 (0.85-1.26)
Number of COPD Medications at Discharge	0.90 (0.67-1.21)	0.97 (0.74-1.28)
Number of Maintenance Medications at Discharge	1.03 (0.84-1.26)	1.02 (0.85-1.24)
Retrospective or Intervention Group	2.22 (0.75-6.59)	**3.64 (1.28-10.36)**

[a]Bold-face entries denote significant differences ($p<0.05$)

Table 4. Differences in Demographic and Health-related Characteristics of All Participants by 30- and 90-Readmissions

	30 day Readmission				90 day Readmission			
	Yes	No	Test Statistic	p-value	Yes	No	Test Statistic	p-value
Gender N(%)			0.29[a]	0.620			0.68[a]	0.441
Male	25 (33.3)	50 (66.7)			35 (47.3)	39 (52.7)		
Female	28 (29.5)	67 (70.5)			51 (53.6)	44 (46.3)		
Age, Mean(SD)	65.19 (11.45)	66.09 (10.58)	0.50[b]	0.615	64.44 (11.12)	67.21 (10.48)	1.66[b]	0.098
Ethnicity, N(%)			3.09[a]	0.214			3.25[a]	0.197
Caucasian	43 (29.4)	103 (70.5)			70 (48.3)	75 (51.7)		
African American	9 (39.1)	14 (60.9)			15 (65.2)	8 (34.8)		
Arabic	0 (0.0)	1 (100.0)			0 (0.0)	1 (100.0)		
Comorbidities, Mean(SD)	5.91 (2.93)	4.91 (2.73)	-2.10[b]	0.038	5.37 (2.98)	5.05 (2.68)	-0.74[b]	0.459
Diseases, N(%)								
Hypertension	33 (30.0)	77 (70.0)	0.09[a]	0.767	53 (48.6)	56 (51.4)	0.48[a]	0.521
Diabetes Mellitus	20 (33.9)	39 (66.1)	0.42[a]	0.600	33 (56.9)	25 (43.1)	0.26[a]	0.153
CHF	18 (39.1)	28 (60.9)	2.074[a]	0.190	26 (56.5)	20 (43.5)	0.890[a]	0.389
COPD medications prior to admission, Mean(SD)	2.87 (1.83)	2.27 (1.71)	-2.08[b]	0.039	2.77 (1.85)	2.10 (1.61)	-2.51[b]	0.013
Other maintenance medications prior to admission, Mean(SD)	10.38 (5.27)	8.33 (5.05)	-2.41[b]	0.017	9.76 (5.36)	8.05 (4.82)	-2.17[b]	0.031
COPD medications at discharge, Mean(SD)	4.32 (1.88)	4.15 (1.80)	-0.58[b]	0.566	4.41 (1.93)	3.98 (1.70)	-1.53[b]	0.127
Other maintenance medications at discharge, Mean(SD)	11.76 (5.43)	10.06 (4.91)	-2.01[b]	0.046	11.24 (5.49)	9.78 (4.52)	-1.88[b]	0.062

a=Pearson Chi Square value; b=t-test t-value