CHRONIC CONDITIONS AND HOSPITALIZATIONS: FINDINGS FROM A RURAL HOSPITAL

Bidisha Mandal, Associate Professor, School of Economic Sciences, Washington State University

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Summary

It is important to understand if current healthcare systems are utilizing hospital resources efficiently and cost-effectively, and whether patients are receiving appropriate care in a timely manner. One of the ways to achieve this goal is to reduce recurrent hospitalizations among patients with chronic conditions. I analyzed 2015–2016 inpatient admissions data from the Pullman Regional Hospital, located in the City of Pullman in Whitman County, which serves a large rural community to examine inpatient admissions related to chronic conditions. I found that chronic kidney disease, chronic obstructive pulmonary disease, heart failure, and hypertension are the most common chronic condition diagnoses during hospital admissions and 30-day readmissions.

Introduction

Patients with multiple chronic conditions have increased risk of hospital admissions as they are particularly susceptible to unsuccessful transitions to home or to another care setting, following hospital discharge (Friedman et al. 2008; Jackson et al. 2013). As of 2014, one in six adults in the United States suffered from at least one chronic condition, and 42 percent of the adult population had multiple chronic conditions (Buttorff et al. 2017). Greater incidences of chronic diseases, along with an aging population who have a higher propensity to suffer from chronic conditions, are a key contributor to rising health care costs in the United States (The Henry J. Kaiser Family Foundation 2012). This has resulted in increased use of inpatient and outpatient care, emergency department visits, and prescription drugs (Buttorff et al. 2017).

One way to reduce recurrent hospitalizations is to identify the underlying reasons of frequent hospitalizations and design appropriate transitional care after discharge from the hospital to meet the needs of vulnerable patients. This report examined inpatient data from the Pullman Regional Hospital to document the chronic conditions most frequently associated with hospital admissions and readmissions. This analysis also identified differences in age, gender, race, and insurance type, between patients who experienced a single inpatient visit and those with two or more inpatient visits within a two-year period.

Inpatient Data

The data consist of all inpatient admissions to the Pullman Regional Hospital from January 1, 2015 until December 31, 2016. Total, there were 3,613 admissions. The identification number of one individual was missing, and that observation was dropped from further analysis. Thus, data from 3,612 observations, spanning 3,199 unique individuals, were used in this study. Table 1 presents the frequency of inpatient admissions. For instance, a "1" denotes one admission only over the two-year period. Similarly, a "2" denotes two admissions (admission and one readmission only) over the two-year period. Out of all inpatient stays, 2,890 individuals (80.01%) had only one hospital stay, 474 individuals (13.12%) had two stays, 168 individuals (4.65%) had three stay, and 80 individuals (2.22%) had four or more inpatient admissions within the two-year period.

Table 1. Admission frequency ($N = 3,612$ admissions in 2015–2016).

Number of admissions	Frequency	Percentage
1	2,890	80.01%
2	474	13.12%
3	168	4.65%
4	44	1.22%
5–10	36	1.00%

Table 2 presents a summary of the patients' profiles who received inpatient care between January 1, 2015 and December 31, 2016 in the Pullman Regional Hospital. They are categorized into those with only one inpatient stay and those with more than one inpatient stay. The average age of patients with only one inpatient visit in 2015–2016 was 34 years, while the average age of patients with more than one inpatient visit in 2015–2016 was 59 years. Consequently, patients with more than one inpatient visit were more likely to be a Medicare beneficiary (Table 2).

Table 2. Descriptive statistics of patients.

Variables	Frequency or Average (Standard Deviation)	
	$N = 2,890$ (one stay only)	$N = 722$ (two or more stays)
Age	33.81 (29.17)	58.98 (24.70)
Male	35.92%	39.20%
Caucasian or White	83.11%	87.81%
Primary Insurance:		
Medicare	19.52%	45.71%
Medicaid	5.78%	1.94%
Blue-Cross/Blue-Shield	10.97%	6.65%
Other Insurance	47.96%	32.13%
Missing or Self-Pay	15.78%	13.57%
Location[†]:		
Urban Core	10.55%	6.79%
Suburban	1.94%	2.77%
Large Rural	69.00%	74.79%
Small Rural	6.57%	6.09%
Isolated Rural	11.90%	9.56%
Any Chronic Condition	30.31%	56.23%
At Least Two Chronic Conditions	15.16%	27.15%

† These categories reflect access to community resources by considering population density and commuting flows to urban cores areas.

In the hospital admission data, there were more women than men with inpatient stays. However, the difference was driven by obstetrics-related inpatient stays among women. Approximately 36% of all patients with one hospital stay, and approximately 39% of all patients with two or more inpatient stays, were men. The primary insurance type was private insurance for patients with a single-admission. However, among those with multiple admissions, the primary payer was Medicare. This is likely to include dual-eligible beneficiaries whose primary payer is Medicare and secondary payer is Medicaid. The Pullman and Palouse region is considered to be a large rural area, according to [the United States Department of Agriculture's rural-urban commuting area codes](). Thus, it is not surprising that a large percentage of both single-admission and multiple-admissions cases are from large rural areas. "Large rural areas" are micropolitan areas with 10% or more out-commuting to large urban clusters.

Chronic Conditions

Algorithms provided by the Chronic Condition Data Warehouse of the Centers for Medicare and Medicaid Services were used to match the diagnosis codes to twenty-three chronic condition categories. The principal diagnosis code and four additional diagnosis codes were used to identify the prevalence of chronic conditions in inpatient admissions. A patient could be suffering from more than one chronic condition, and it is not necessary that a chronic condition was the primary cause of hospital admission. However, patients with multiple chronic conditions have increased risk of hospital admissions as they are particularly susceptible to unsuccessful transitions following hospital discharge (Friedman et al. 2008; Jackson et al. 2013).

There were 2,200 instances of the twenty-three chronic conditions among the 3,612 admissions in the 2015–2016 inpatient data. Prevalence of these chronic conditions, and associated average hospital-stay charge per day, are presented in Table 3. Rheumatoid arthritis or osteoarthritis (21.7%), hypertension (20.8%), and chronic kidney disease (10.2%) were the three most prevalent chronic conditions among the hospitalized patients.

Table 3. Chronic conditions and average total hospital charges per day of inpatient stay ($N = 2{,}200$).

Chronic Condition	Cases	Charge Per Day ($)
Rheumatoid Arthritis or Osteoarthritis	478	12,576.49 (3,593.09)
Hypertension	458	9,803.77 (5,136.35)
Chronic Kidney Disease	225	5,392.54 (4,243.27)
Anemia	169	5,514.48 (3,773.19)
Diabetes	154	7,268.56 (5,035.93)
COPD and Bronchiectasis	99	5,206.96 (3,300.38)
Acquired Hypothyroidism	96	10,621.29 (5,389.21)
Heart Failure	77	4,683.94 (2,656.27)
Prostate Cancer	68	12,176.02 (5,056.36)
Asthma	66	5,261.91 (3,056.75)
Ischemic Heart Disease	52	6,636.87 (5,055.40)
Hip or Pelvic Fracture	48	5,530.71 (2,827.69)
Atrial Fibrillation	42	6,854.54 (6,204.34)
Depression	33	5,661.34 (4,189.09)
Hyperlipidemia	31	11,190.52 (4,183.32)
Stroke or Transient Ischemic Attack	30	3,660.34 (2,177.40)
Female or Male Breast Cancer	26	8,774.73 (4,339.84)
Colorectal Cancer	19	8,379.19 (4,390.65)
Acute Myocardial Infarction	10	4,337.11 (2,463.02)
Benign Prostatic Hyperplasia	9	10,849.33 (4,840.83)
Osteoporosis	6	9,311.35 (5,224.79)
Lung Cancer	3	5,756.88 (833.83)
Endometrial Cancer	1	6,723.70

Standard deviations are in parenthesis.

30-Day Readmissions

Reducing preventable hospitalizations and readmissions is seen as a key strategy for improving health, the quality of care, and cost containment (Trudnak et al. 2014). Currently, the Centers for Medicare and Medicaid Services uses a [30-day risk standardized readmission measure](#) as an accountability measure for all hospitals. This measure includes all-cause unplanned readmissions that happen within thirty days of discharge from the initial admission, and patients who are readmitted to the same hospital, or another applicable acute care hospital for any reason. The current analysis is limited to data from one hospital. Moreover, only admissions and readmissions associated with chronic conditions were considered, since chronic conditions

are generally incurable but are often preventable through early detection or manageable.

There were 138 cases of 30-day readmission. If the gap between an admission date and the previous discharge date was less than or equal to 30 days, then the readmission was designated as a 30-day readmission. Out of the 138 cases of 30-day readmission, 62 cases (44.9%) reported at least one chronic condition with a total of 86 chronic conditions, and 20 cases (14.5%) reported at least two chronic conditions with a total of 44 chronic

conditions. These chronic conditions are listed in Table 4.

The hospitalization cost of 29 cases of 30-day readmission, where the same chronic condition was reported in both the original admission and at readmission, are presented in Table 5. For some of the cases, the hospitalization cost at readmission were significantly higher than the prior admission cost. Readmission rates are found to be higher among patients with multiple chronic conditions as they are vulnerable to unsuccessful transitions following hospital discharge (Friedman et al. 2008).

Table 4. List of chronic conditions reported in 30-day readmission.

Number of Chronic Conditions	Chronic Conditions
At Least One	Acquired hypothyroidism (1); acute myocardial infarction (1); anemia (9); asthma (4); atrial fibrillation (4); benign prostatic hyperplasia (1); chronic kidney disease (20); chronic obstructive pulmonary disease and bronchiectasis (7); depression (3); diabetes (6); heart failure (9); hip or pelvic fracture (2); hypertension (13); ischemic heart disease (2); rheumatoid arthritis or osteoarthritis (3); stroke or transient ischemic attack (1)
At Least Two	Acquired hypothyroidism (1); acute myocardial infarction (1); anemia (4); asthma (4); atrial fibrillation (3); chronic kidney disease (6); chronic obstructive pulmonary disease and bronchiectasis (4); depression (1); diabetes (1); heart failure (6); hip or pelvic fracture (1); hypertension (7); ischemic heart disease (2); rheumatoid arthritis or osteoarthritis (2); stroke or transient ischemic attack (1)

Table 5. Total hospital charges of admission and 30-day same-reason readmission.

Chronic Condition	Cases	Original Charge ($)	Readmission Charge ($)
Anemia	1	2,078.96	7,786.51
Asthma	3	5,367.71 (1,263.03)	5,422.57 (2,318.01)
Atrial Fibrillation	2	5,177.63 (1,817.46)	4,412.01 (1,909.55)
Chronic Kidney Disease	8	4,077.91 (2,206.98)	4,910.51 (2,101.72)
COPD and Bronchiectasis	4	4,619.81 (1,816.84)	4,434.40 (2,736.43)
Diabetes	3	7,469.91 (6,592.98)	2,911.26 (1,781.91)
Heart Failure	2	3,551.47 (1,918.87)	3,905.46 (383.29)
Hypertension	5	6,778.87 (4,530.81)	4,384.96 (1,064.10)
Ischemic Heart Disease	1	3,205.57	4,466.39

Standard deviations are given in parenthesis.

Conclusions and Implications

The Centers for Medicare and Medicaid Services uses hospital readmission rates as a measure for quality of inpatient and outpatient care and for care transitions following hospital discharge (Axon and Williams 2011). This type of an accountability measure is then used to link Medicare and Medicaid reimbursement payments to performance and cost containment (Bruen et al. 2011).

However, an unintended consequence is that this metric does not adjust for whether hospitals are caring for disproportionately higher economically disadvantaged patients or other important confounders (Benbassat and Taragin 2000). Toth et al. (2015) found that rural Medicare beneficiaries have fewer follow-up visits post hospital discharge when compared to their urban counterparts and that they have greater incidences of use of emergency departments.

Yet, when similar levels of transitional care are provided to rural and urban Medicare beneficiaries in traditional fee-for-service plans, there is no rural versus urban difference in post-discharge outcomes (Toth et al. 2017). In the Medicaid population, patients with mental health or substance abuse issues are high utilizers of health care and account for a large portion of readmissions (Regenstein and Andres 2014; Trudnak et al. 2014). Suboptimal post-discharge care environments are often correlated with high risk of readmissions among both Medicaid and Medicare patients.

Transitional care refers to a set of safe and timely services for patients as they move from one care setting to another (Coleman and Boult 2003; Naylor 2003). To design an effective transitional care management program, it is important to first determine the underlying health issues leading to frequent hospital admissions and readmissions. This report examines 2015–2016 inpatient data from the Pullman Regional Hospital, located in a large rural area, and determines that chronic kidney disease, chronic obstructive pulmonary disease, heart failure, and hypertension are the most common chronic condition diagnoses during hospital admissions and 30-day readmissions. Both inpatient and outpatient care utilization data will be analyzed in the future to obtain a better understanding of post-discharge environments and factors associated with high risk of readmission for each of the chronic conditions identified in this study.

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