PRHI Readmission Briefs

Brief I: Overview of Six Target Chronic Diseases

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Unlike the Dartmouth Atlas, the PHC4 database studied all patients, not just Medicare.

INTRODUCTION

As healthcare costs consume more and more of American resources, driven in large measure by the growing burden of chronic disease, both policy proposals and demonstration projects are exploring ways to improve care and to reduce costs. In many of these efforts, hospital readmission rates have become an important measure of both quality and costs. Not only are readmission rates extraordinarily high (in a recently-published estimate,[1] 17.6% of Medicare beneficiaries were readmitted within 30 days of discharge, resulting in $15 billion in spending annually), but between 10% and 50% of readmissions are considered to be potentially avoidable.[2] Lastly, 30-day readmission rates have become important hospital financial metrics, as payors – most notably Medicare — are increasingly denying coverage without detailed medical justification for the readmission.

Using a readmission rate as a quality or cost measure, however, is not without shortcomings. There are numerous questions, for example, about the positive and negative impact on provider behavior of rewarding, penalizing and/or publishing readmission rates. The need for more information about the nature and characteristic of hospital readmissions is clear. The **PRHI Readmission Briefs** aim to add clarity to the debate by developing a series of reports that focus on the following questions:

1. What is the "right" time frame for defining a potentially avoidable readmission? For how many days past discharge is a readmission potentially preventable, and how does this vary by condition?

2. To what extent are readmissions likely to be related to an initial admission and to what extent does this vary across diagnoses?

3. To what extent are readmissions within the domain of hospital control?

4. Are there patterns of admissions and readmissions that can help clinicians flag, and then prevent, unnecessary hospitalizations?

Readmission Brief I begins with a comparative overview of admissions and readmissions to acute care hospitals in Southwestern Pennsylvania (SWPA) of patients with six key chronic conditions, between October 2007 and September 2008. Subsequent **Briefs** will focus in greater depth on specific chronic conditions, adding more detailed analyses about characteristics of both admissions and patients, including number of days between discharge and readmission, length of stay and hospital charges, as well as detailed analyses of diagnoses, patient demographics, severity of condition, presence and number of specific co-morbidities (including behavioral health co-morbidities), and patterns of patient admission, discharge and readmission over multiple hospitalizations.

METHODS

The report draws on hospital admissions data collected by the Pennsylvania Health Care Cost Containment Council (PHC4),[3] an independent agency created by the Pennsylvania Legislature in 1986 with the mandate to collect a wider range of inpatient data, irrespective of payer or claims.[4] PHC4 is one of the nation's more comprehensive sources of all-payer, inpatient data. The data for this study are drawn from a database of 408,925 all-cause admissions to 44 acute care facilities in the 11-counties of Southwestern Pennsylvania (SWPA).[5]

Admissions for patients with six target chronic conditions were identified using Medicare Severity Diagnostic Related Groups (MS-DRGs), which replaced DRGs on October 1, 2007. Like DRGs, MS-DRGs classify the reason for a hospitalization based on a series of principal and secondary diagnoses as well as procedure codes. In addition, unlike DRGs, MS-DRGs incorporate severity of the patient condition with codes that mark the presence of complications and comorbidities. This adjustment allows for enhanced payments to hospitals that care for sicker patients within the same MS-DRG. Hospitalizations for patients with the following chronic conditions will be the focus of this inquiry.

Chronic Condition	Diagnostic Category
Heart Failure	MS-DRG 291-293
Chronic Obstructive Pulmonary Disease (COPD)	MS-DRG 190-192
Acute Myocardial Infarction (AMI)[6]	MS-DRG 280-285
Depression	MS-DRG 881
Asthma	MS-DRG 202-203
Diabetes	MS-DRG 637-639

Readmission rates are defined as a discharge from, followed by an admission to an acute care hospital within a specified period of time, and are calculated after excluding from the denominator patients who died during the initial, or "index" admission. All analyses also exclude patients who were transferred on the day of discharge to another acute care hospital, children ages 18 years and younger, as well as admissions with missing age or principal diagnosis, missing or invalid discharge status, or a MS-DRG classification of 999 (diagnoses and/or procedures that are "ungroupable"). We examine readmissions that occur within the 12 months of the available data, following the index admission. Finally, while the PHC4 data permit analyses of both admissions and patients (who may have had multiple admissions during the period), this report focuses exclusively on admissions. In subsequent, disease-specific *Briefs*, both admissions and patients will be the subjects of inquiry.

OVERVIEW OF ADMISSIONS AND READMISSIONS

The six target conditions account for more than 40,000 hospital admissions in SWPA in the study period. These admissions represent 10% of all admissions and 14% of all medical admissions[7] and are among the 21 most common medical MS-DRG admissions (from the group of more than 350) in SWPA. Heart failure and COPD alone account for 9% of all medical admissions.

Table 1. Overview of Targeted Chronic Disease Admissions in SWPA

Targeted Condition	Number of Admissions	Percent of all MS-DRGs	Percent of Medical MS-DRGs	Ranking Among Medical MS-DRGs*
Heart Failure	13,503	3%	5%	3
COPD	12,137	3%	4%	4
AMI	4,728	1%	2%	11
Depression	3,477	1%	1%	18
Asthma	3,392	1%	1%	19
Diabetes	3,029	1%	1%	21
Total	**40,266**	**10%**	**14%**	**-**

*The top 10 medical diagnoses in the PHC4 data set are, in ranked order: psychoses, normal childbirth, heart failure, COPD, digestive disorders, rehabilitation, septicemia, cellulitis, pneumonia, and chest pain.

As shown in Table 2, these six conditions also account for nearly 9,000, 30-day readmissions and 19,000 readmissions within the 12-month study period. All but asthma are in the top 20 reasons for readmissions among medical MS-DRGs. Readmission rates average 22% within 30 days – almost the same as the average for all other medical MS-DRGs (21%) and similar to the 19.6% that Jencks found using Medicare data.[8]

One in 5 hospital discharges were readmitted within a month.

Table 2. Readmissions within 30 Days and within 12-Month Study Period

Targeted Condition	30-Day Readmissions			Readmissions within 12 Months		
	Number	Readmit Rate	Ranking Among Medical MS-DRGs	Number	Readmit Rate	Ranking Among Medical MS-DRGs
Heart Failure	3,392	26%	1	7,242	55%	1
COPD	2,716	23%	3	6,028	50%	3
AMI	1,010	23%	7	1,892	44%	8
Depression	640	18%	14	1,349	39%	17
Asthma	355	10%	32	1,058	31%	23
Diabetes	618	21%	16	1,351	45%	16
Total Targeted Conditions	8,731	22%	-	18,920	47%	-

The economic costs associated with these admissions and readmissions are enormous. Measured by hospital-provided charge data, these six conditions account for over $658 million in total charges (not actual payments), with heart failure alone accounting for nearly $247 million (Table 3).

Table 3. Average Total Charges and Length of Stay (LOS)

Targeted Condition	Average LOS	Average Total Charge	Total Charge
Heart Failure	5.3	$ 18,266	$ 246,650,362
COPD	4.9	$ 15,196	$ 184,429,221
AMI	5.0	$ 23,850	$ 112,760,806
Depression	5.1	$ 8,724	$ 30,334,163
Asthma	3.9	$ 11,465	$ 38,888,219
Diabetes	3.9	$ 14,855	$ 44,996,596

Six common chronic medical diseases incurred annual hospital charges of nearly $250 million in southwestern Pennsylvania.
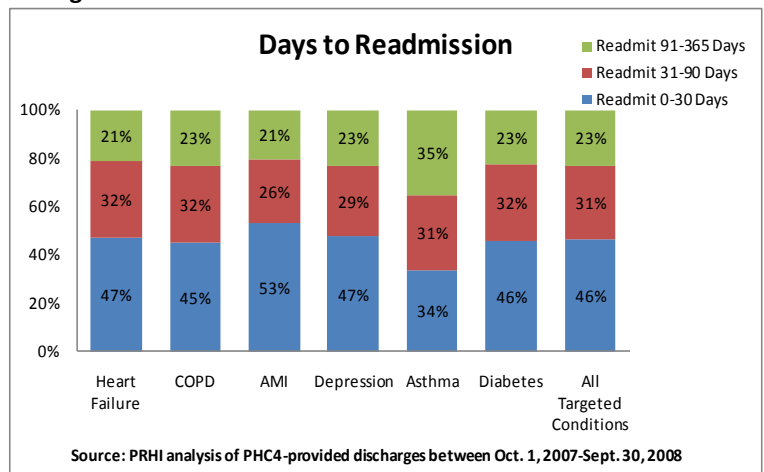
TIMEFRAME FOR DEFINING READMISSIONS

Readmissions may be defined using various time frames. As the clinical relevance for a 30-day readmission is not always obvious, this section examines various timeframes for defining a readmission. Of interest is not only when most patients return, but also the potential savings from avoiding readmission within various timeframes.

Days to Readmission

Figure 1 shows the distribution of all readmissions across three periods of time: within 30 days, between 31 and 90 days, and between 91 and 365 days. The 30-day timeframe captures the largest share of readmissions for every condition except asthma. The data confirm that readmissions occur disproportionately closer to the day of discharge, with an average of 46% across all six conditions occurring in the first 30 days, and nearly 80% occurring within three months. The implication is that the first 30 days is the critical interval, and represents the greatest opportunity for improvement.

Figure 1

Days to Readmission

Legend: Readmit 91-365 Days · Readmit 31-90 Days · Readmit 0-30 Days

Condition	Readmit 0-30 Days	Readmit 31-90 Days	Readmit 91-365 Days
Heart Failure	47%	32%	21%
COPD	45%	32%	23%
AMI	53%	26%	21%
Depression	47%	29%	23%
Asthma	34%	31%	35%
Diabetes	46%	32%	23%
All Targeted Conditions	46%	31%	23%

Source: PRHI analysis of PHC4-provided discharges between Oct. 1, 2007-Sept. 30, 2008

POTENTIALLY PREVENTABLE READMISSIONS

It is estimated that 10% of readmissions are "scheduled" – a figure we accept as plausible.[9] Understanding what readmissions among the remaining 90% are potentially preventable requires, as an initial step, an assessment of which admissions are related to one another. Recognizing that there are complex methods for establishing such relationships,[10] we, nevertheless, begin by identifying: (1) readmissions with the same MS-DRG as the index admission; and (2) readmissions for PHC4-defined complications or infections.
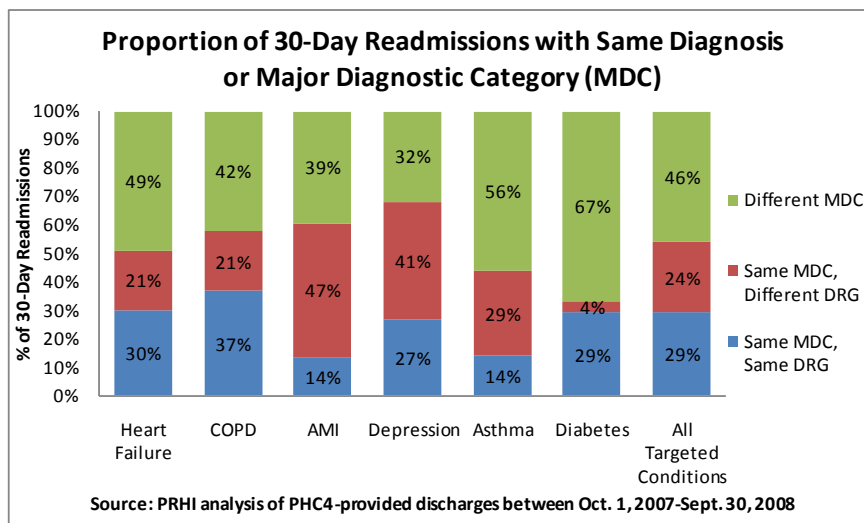
Reasons for Readmission

This section assumes that sequential admissions with the same diagnosis are more likely to be related to one another, and that some of these are likely to be unplanned and potentially preventable. For our purposes, a readmission was considered related to an index admission if any of the MS-DRG codes defining the condition were present on both. For example, COPD is defined using MS-DRG codes of 190-192; a readmission with MS-DRG 190 is considered related to an index admission with MS-DRG 191.

As shown in Figure 2, just over half of the 30-day readmissions for all targeted conditions are for the same major diagnostic category (MDC), although only 29% are for the same diagnosis. Specifically for asthma and diabetes, the majority of 30-day readmissions were for conditions *other than* the MDC registered on the index admission. Overall, 70% of 30-day readmissions for each condition are for a different diagnosis. Worthy of follow-up analysis is the fact that only 14% of 30-day readmission for patients who had asthma on the index admission were also for asthma. These findings suggest that patients with chronic disease are indeed complex and that readmission reduction efforts that ignore the complexity of chronic disease comorbidities are less likely to be effective. Future research briefs on the specific targeted conditions will provide more in-depth analysis on what other diagnoses these patients are returning with.

> *70% of 30-day readmissions came back with a different medical diagnosis.*

Figure 2

Proportion of 30-Day Readmissions with Same Diagnosis or Major Diagnostic Category (MDC)

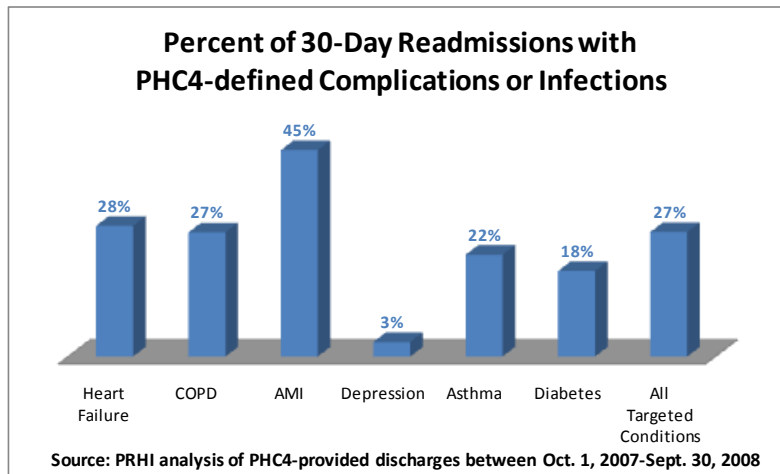Source: PRHI analysis of PHC4-provided discharges between Oct. 1, 2007-Sept. 30, 2008

Readmissions for Complications or Infections

Admissions due to clearly preventable events – infections and complications – are of immense importance. The Centers for Medicare and Medicaid Services (CMS) has now been referring to some events in this category as "never events," meaning that they should never occur, and withholding payment accordingly. Using the Pennsylvania Health Care Cost Containment Council's definition of a complication or infection,[11] Figure 3 shows the proportion of 30-day readmissions (by diagnosis on the index admission) for complications or infections.

More than one in four readmissions of patients who were initially admitted for heart failure or COPD, and one in five readmissions for asthma and diabetes, were readmitted with PHC4-defined complications or infections. The rate for AMI is a clear outlier in this cluster, a fact which will be explored in greater depth in the upcoming **Heart Disease Readmissions Brief**.

Figure 3

Percent of 30-Day Readmissions with PHC4-defined Complications or Infections

Heart Failure 28%, COPD 27%, AMI 45%, Depression 3%, Asthma 22%, Diabetes 18%, All Targeted Conditions 27%

Source: PRHI analysis of PHC4-provided discharges between Oct. 1, 2007-Sept. 30, 2008

Aside from the obvious negative impact on patients, readmissions for complications and infections resulted in longer average LOS and much higher costs. Table 4 shows that average LOS for 30-day readmissions was 30% to 63% higher than on all index admissions. Total average charges were even higher – ranging from twice to four times the average on all index admissions.

Table 4. Ratio of 30-day Readmissions with Complication or Infection Relative to Index Admission

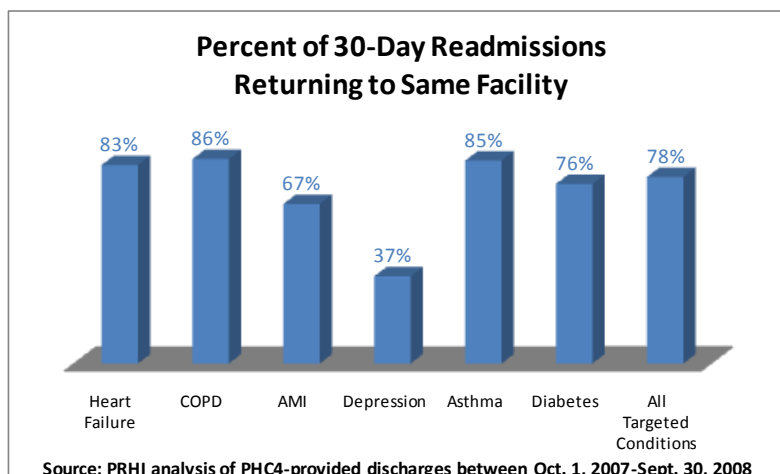| Targeted Condition on Index Admission	Ratio of Length of Stay	Ratio of Average Total Charge
Heart Failure	1.33	1.95
COPD	1.48	2.00
AMI	1.34	2.08
Depression	1.30	4.23
Asthma	1.61	2.36
Diabetes	1.63	2.13

LOCUS OF HOSPITAL CONTROL

A series of studies has begun to identify the kinds of steps needed to reduce avoidable readmissions.[12,13,14] Measures include instituting more effective discharge planning, preventing premature discharges, improving quality of inpatient care, and improving care coordination both within the hospital and between inpatient and outpatient providers. Clearly, however, not all of these measures are within the hospital's sole locus of control. This section makes an initial assessment of what admissions are potentially within a hospital's locus of control by asking whether or not a patient was readmitted to the same hospital from which s/he was discharged.

Figure 4 indicates that such "locus of control" is very high for COPD, asthma and heart failure, and substantially lower for AMI and, especially, for depression. Generally heart failure, diabetes, COPD and asthma are managed by primary care providers (PCP); patients will typically go to the PCP's hospital, and most PCPs admit to just one hospital – all of which suggest that there are numerous opportunities for inpatient-outpatient readmission reduction initiatives. On the other hand, a patient with an AMI is likely to go to the closest hospital; and, in the event of a readmission, to go to the PCP's hospital. Similarly, psychiatric patients are not likely to return to a psychiatric hospital for a medical problem. Better understanding what conditions return to the same hospital will be a goal of follow-up analyses.

Figure 4

Percent of 30-Day Readmissions Returning to Same Facility

Heart Failure: 83%
COPD: 86%
AMI: 67%
Depression: 37%
Asthma: 85%
Diabetes: 76%
All Targeted Conditions: 78%

Source: PRHI analysis of PHC4-provided discharges between Oct. 1, 2007-Sept. 30, 2008

DISCUSSION

This *PRHI Readmission Brief* has responded to the need for more information about nature and characteristic of hospital readmissions to inform policy, provider and patient choices. Using all-payer data collected by the Pennsylvania Health Care Cost Containment Council between October 2007 and October 2008, it provides an overview of admissions and readmissions for six chronic conditions that accounted for 40,000 admissions, nearly 19,000 readmissions and $658 million in hospital charges in Southwestern Pennsylvania.

The 30-day readmission metric, a longstanding Medicare marker of a potentially avoidable admission, has not been rigorously tested. Seemingly, patients should do well for the first 30 days following hospital discharge. They should have received new pre-discharge patient education; at minimum, a 30-day supply of medications; and a clear action plan and follow-up. And yet, Medicare data show that one in five Medicare patients ends up back in the hospital within 30 days, and of those readmitted within 30 days, 50% did not see their primary care physician for a follow-up appointment following hospital discharge.[15] At issue is whether these observations can be extended beyond the Medicare population.

We have found in this much more comprehensive database spanning all payer classes that the readmission metric does indeed hold, with 22% of admissions for patients with six target chronic conditions resulting in readmissions within 30 days. More disturbingly, an average of 27% of 30-day readmissions for the target conditions were for PHC4-defined complications or infections – expensive conditions for which effective preventive strategies have been formulated, but are often underutilized. Finally, 70% of 30-day readmissions were not for the same disease in exacerbation, but for something else, suggesting that effective readmission reduction efforts must account for the complexity of chronic disease comorbidities. Follow-up *Briefs* will explore these issues at greater depth for each of the six target chronic conditions.

[1] MedPac Report to Congress, "Promoting Greater Efficiency in Medicare, Chapter 5: Payment Policy for Inpatient Readmissions", June 2007, http://www.medpac.gov/chapters/Jun07_Ch05.pdf , Accessed 03 December 2009.

[2] Jencks, SF, "Rehospitalization: The Challenge and the Opportunity for CVEs," Presentation 29 October 2009.

[3] The Pennsylvania Health Care Cost Containment Council (PHC4) is an independent state agency responsible for addressing the problem of escalating health costs, ensuring the quality of health care, and increasing access to health care for all citizens regardless of ability to pay. PHC4 has provided data to this entity in an effort to further PHC4's mission of educating the public and containing health care costs in Pennsylvania.

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This analysis was not prepared by PHC4. This analysis was done by the Pittsburgh Regional Health Initiative. PHC4, its agents and staff, bear no responsibility or liability for the results of the analysis, which are solely the opinion of this entity.

[4] PHC4 was created by the Pennsylvania Legislature in 1986. For more information about PHC4, please see http://www.phc4.org/. See also Burton, Thomas M., "Hospitals Find Way to Make Care Cheaper – Make it Better," Wall Street Journal, October 6, 2009, Page A1, http://online.wsj.com/article/SB125478721514066137.html Accessed 17 December 2009.

[5] Southwestern Pennsylvania is an 11-county area including Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Lawrence, Somerset, Washington, and Westmoreland Counties.

[6] While Acute Myocardial Infarction (AMI) is clearly not a chronic disease, it is nevertheless often the first time patients with underlying heart disease present to the medical system. As with the other target chronic conditions, care following AMI involves long-term disease management strategies that involve the patient and both inpatient and community health providers.

[7] Medical admissions are defined using MS-DRGs.

[8] Jencks SF, Williams MV, Coleman EA. "Rehospitalizations among patients in the Medicare fee-for-service program," New England Journal of Medicine 2009;360:1418-1428, http://content.nejm.org/cgi/content/full/360/14/1418?ijkey=f60b0a902b65f3fcbbb5300bbd25ac239f7d3734, Accessed 17 December 2009.

[9] Ibid.

[10] See for example, the Potentially Preventable Readmissions (PRP) Solutions developed by 3M Health Information Systems, http://solutions.3m.com/wps/portal/3M/en_US/3M_Health_Information_Systems/HIS/Products/PPR/ , Accessed 03 December 2009.

[11] For definition, see Pennsylvania Health Care Cost Containment Council, "Hospital Performance Report Federal Fiscal Year 2008 Technical Notes," 2009, http://www.phc4.org/reports/hpr/08/docs/hpr2008technotes.pdf, Accessed on 09 October 2009.

[12] Coleman EA, Parry C, Chalmers S, Min S-J. The care transitions intervention: results of a randomized controlled trial. Arch Intern Med 2006;166:1822-1828, http://archinte.ama-assn.org/cgi/content/abstract/166/17/1822?ijkey=c64c8609cc2da41631f5e1139ebf8cd0789ec423&keytype2=tf_ipsecsha, Accessed 17 December 2009.

[13] Naylor, MD, Brooten DA, Campbell RL, Maislin G, McCauley KM, Schwartz JS. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. Journal of the American Geriatric Society 2004;52:675-684.

[14] Jack BW, Chetty VK, Anthony D, et al. "A reengineered hospital discharge program to decrease rehospitalization: a randomized trial," Annals of Internal Medicine 2009;150:178-187, http://www.annals.org/content/150/3/178.abstract?ijkey=221513e29298143a7bc4931f14d30e6e1f9f20fe&keytype2=tf_ipsecsha, Accessed 17 December 2009.

[15] Jencks, op. cit., NEJM, 2009.