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Trends in Hospital Readmissions for Four High-Volume Conditions, 2009–2013

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Introduction

Hospital readmissions can have negative consequences for patients and the hospitals at which they are treated, and also are costly for both public and private payers. In 2011, Medicare paid for 58 percent of all readmissions, followed by private insurance (20 percent) and Medicaid (18 percent).[1] Readmissions are a significant portion of Medicare spending—37 percent of total Medicare spending is for inpatient care, and 18 percent of all inpatient admissions paid by Medicare are readmitted within 30 days, accounting for $15 billion in costs annually.[2] In addition to these costs, repeat hospitalizations place patients at greater risk for complications, hospital acquired infections, and stress.[3] Because the majority of readmissions are for nonsurgical services, it is unlikely that readmissions are profitable for hospitals.[4]

Although it may be necessary to readmit some patients, the fact that risk-adjusted readmission rates vary considerably across hospitals suggests that certain readmissions may be prevented through hospital practices, such as improving patient discharge instructions, coordinating postacute care, and reducing medical complications during the initial hospital stay.[5]

The Affordable Care Act established the Centers for Medicare & Medicaid Services Hospital Readmissions Reduction Program (HRRP) to provide a financial incentive for hospitals to reduce preventable readmissions. Effective in 2013, the HRRP imposes a financial penalty for hospitals with excess rates of readmissions for acute myocardial infarction (AMI), congestive heart failure

[1] Hines AL, Barrett ML, Jiang HJ, Steiner CA. Conditions With the Largest Number of Adult Hospital Readmissions by Payer, 2011. HCUP Statistical Brief #172. April 2014. Agency for Healthcare Research and Quality, Rockville, MD. http://www.hcup-us.ahrq.gov/reports/statbriefs/sb172-Conditions-Readmissions-Payer.pdf. Accessed October 22, 2015.
[2] Minott J. Reducing Hospital Readmissions. Washington, DC: Academy Health; November 2008. http://www.academyhealth.org/files/publications/ReducingHospitalReadmissions.pdf Accessed June 12, 2015.
[3] Ibid.
[4] Ibid.
[5] Boccuti C, Casillas G. Aiming for Fewer Hospital U-turns: The Medicare Hospital Readmissions Reduction Program. Menlo Park, CA: The Henry J. Kaiser Family Foundation; January 2015. http://kff.org/medicare/issue-brief/aiming-for-fewer-hospital-u-turns-the-medicare-hospital-readmission-reduction-program/. Accessed June 12, 2015.

Highlights

- In 2013, there were about 500,000 readmissions totaling $7 billion in aggregate hospital costs for four high-volume conditions—acute myocardial infarction (AMI), congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), and pneumonia.
- Among initial hospital stays (*index stays*) for AMI, CHF, COPD, and pneumonia, the aggregate cost of readmissions in 2013 was $5.2 billion for Medicare—74 percent of the aggregate cost of readmissions for these four conditions.
- From 2009 to 2013, the readmission rate for stays covered by Medicare decreased by 13 percent for AMI, by 7 percent each for CHF and COPD, and by 6 percent for pneumonia.
- Overall, the largest decrease in readmission rate from 2009 to 2013 was for AMI (by 13 percent, from 16.9 to 14.7 readmissions per 100 index stays for AMI). Although the rate declined overall (across payers), the aggregate cost of readmissions following an index stay for AMI decreased only among index stays covered by private insurance (by 18 percent).
- Although Medicare was the only payer for which the rate of readmission for pneumonia decreased from 2009 to 2013, the aggregate cost of readmissions for pneumonia decreased for all payers, by 6–26 percent.
- The aggregate cost of readmissions following an index stay for any of the four conditions decreased from 2009 to 2013 for all payers, except the uninsured whose rate remain unchanged. The largest declines were for index stays paid by private insurance (22 percent) and Medicare (9 percent).

(CHF), and pneumonia among Medicare beneficiaries. In 2015, penalties also will be calculated based on readmissions for chronic obstructive pulmonary disease (COPD) and hip and knee replacements.[6] CMS includes these conditions and procedures because of their high volume and costs.[7]

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief examines trends from 2009 through 2013 for all readmissions following an admission for any cause, as well as for readmissions following an admission for four high-volume conditions targeted by the HRRP: AMI, CHF, COPD, and pneumonia. *Readmission* was defined as a subsequent hospital admission for any cause within 30 days following an initial hospital admission, referred to as the *index stay*. Because all-cause readmissions were examined, readmissions may or may not be related to the primary reason for admission during the index stay. Trends in the rate and aggregate cost of readmissions were examined overall and by expected payer of the index stay. Therefore, the expected payer of the readmission may be different from that of the index stay. Aggregate costs are those for the readmission only, not counting the cost of the index stay. Differences of greater than 5 percent are noted in the text.

Findings

Readmission rates among high-volume conditions, 2013

Table 1 presents conditions with at least 250,000 index stays that had the highest rate of readmission for all causes within 30 days in 2013. The four highlighted conditions—AMI, CHF, COPD, and pneumonia—are the focus of this Statistical Brief.

[6] Boccuti C, Casillas G. Aiming for Fewer Hospital U-turns: The Medicare Hospital Readmissions Reduction Program. Menlo Park, CA: The Henry J. Kaiser Family Foundation; January 2015. http://kff.org/medicare/issue-brief/aiming-for-fewer-hospital-u-turns-the-medicare-hospital-readmission-reduction-program/. Accessed June 12, 2015.

[7] Thorpe JH, Cascio T. Medicare Hospital Readmissions Reduction Program. Legal Notes. 2011;3(4):1–4. http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2011/rwjf71483. Accessed June 12, 2015.

Table 1. High-volume conditions ranked by rate of readmission for all causes within 30 days, 2013

Rank	Principal diagnosis for index hospital stay	Number of index admissions	Number of all-cause readmissions	Aggregate cost of readmissions, $ millions	Rate of all-cause readmission
Total index admissions for any cause		**28,124,869**	**3,900,556**	**52,398**	**13.9**
1	Congestive heart failure, non-hypertensive	782,079	183,534	2,728	23.5
2	Schizophrenia and other psychotic disorders	366,256	83,245	772	22.7
3	Respiratory failure, insufficiency, arrest (adult)	290,892	62,684	961	21.5
4	Diabetes mellitus with complications	486,886	99,108	1,204	20.4
5	Acute renal failure	431,452	87,537	1,190	20.3
6	Chronic obstructive pulmonary disease and bronchiectasis	570,077	114,067	1,384	20.0
7	Complication of device, implant or graft	581,289	111,838	1,973	19.2
8	Alcohol-related disorders	261,072	50,081	366	19.2
9	Septicemia	1,011,496	191,156	3,154	18.9
10	Fluid and electrolyte disorders	358,640	65,704	839	18.3
11	Complications of surgical procedures or medical care	426,917	76,292	1,212	17.9
12	Pancreatic disorders (not diabetes)	271,749	47,111	563	17.3
13	Gastrointestinal hemorrhage	328,428	55,173	741	16.8
14	Urinary tract infection	470,448	73,633	854	15.7
15	Intestinal obstruction without hernia	314,811	48,753	696	15.5
16	Pneumonia	824,700	127,601	1,809	15.5
17	Mood disorders	747,029	114,385	930	15.3
18	Acute myocardial infarction	485,462	71,300	1,043	14.7
19	Dysrhythmia	651,881	94,883	1,225	14.6
20	Coronary atherosclerosis and other heart disease	433,782	55,265	793	12.7

Notes: Only conditions with greater than 250,000 index stays are shown. Principal diagnosis is based on the Clinical Classifications Software (CCS). Costs include those of the readmission only, excluding the cost of the index stay.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), Nationwide Readmissions Database (NRD), 2013

- **AMI, CHF, COPD, and pneumonia accounted for 13 percent of all readmissions, as well as 13 percent of aggregate hospital costs for readmissions in 2013.**

  In 2013, there were 496,502 readmissions following an index stay for AMI, CHF, COPD, or pneumonia, accounting for 13 percent of all readmissions. Aggregate hospital costs for readmissions following an index stay for any of these four conditions totaled $7.0 billion—13 percent of aggregate costs for all readmissions.

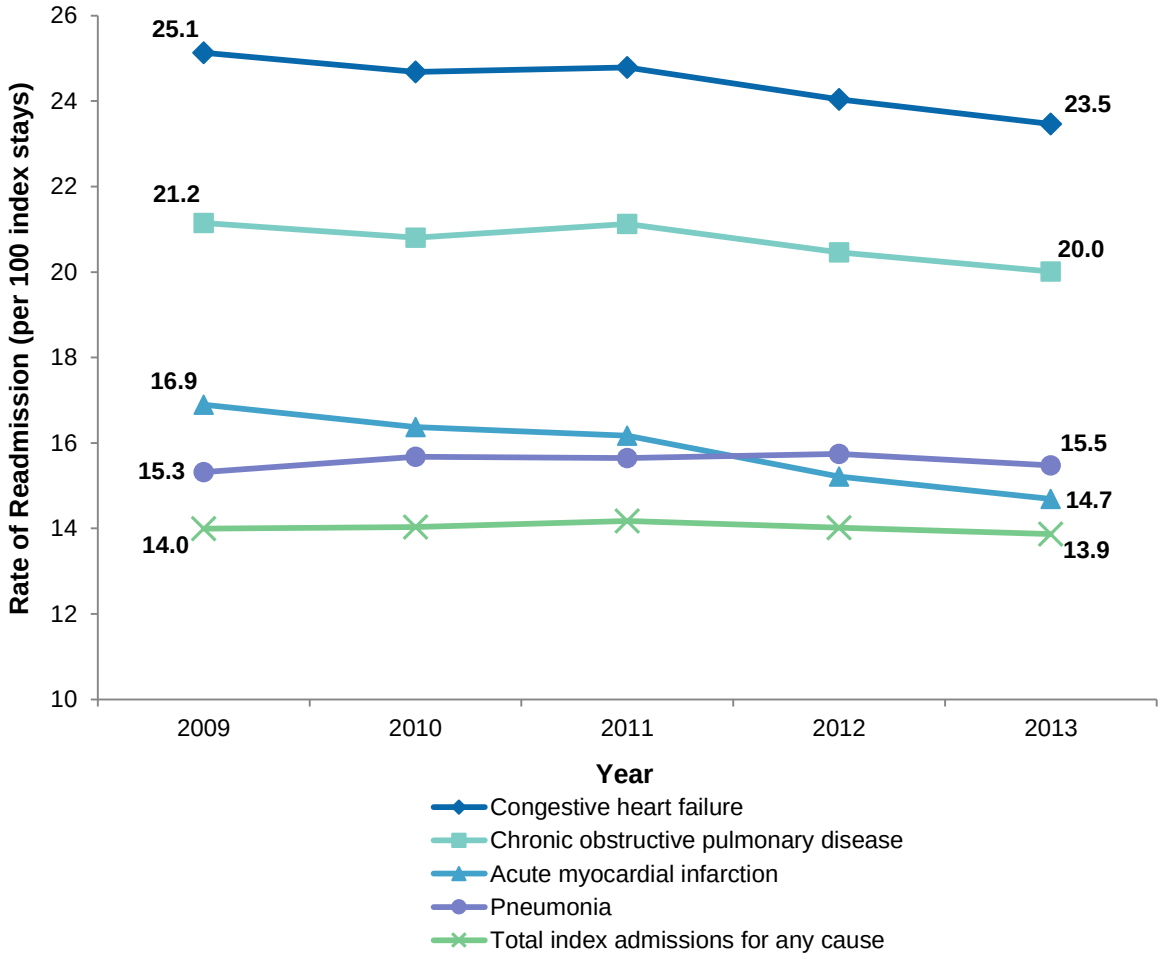
- **Readmission rates for AMI, CHF, COPD, and pneumonia were more than 5 percent higher than the overall readmission rate of 13.9 per 100 index stays.**

  The rate of readmission following an index stay for CHF was the highest (23.5 per 100 index stays) among high-volume conditions with at least 250,000 index stays and was 69 percent higher than the rate of readmission overall (13.9). The rate of readmission was 20.0 per 100 index stays for COPD and 15.5 per 100 index stays for pneumonia—44 and 12 percent higher, respectively, than the rate of readmission overall. The rate of readmission for AMI (14.7) was 6 percent higher than the overall readmission rate in 2013.

Trends in readmissions for AMI, CHF, COPD, and pneumonia, 2009–2013

Figure 1 presents trends in the rate of readmissions for any cause within 30 days, per 100 index stays, overall and for four high-volume conditions from 2009 through 2013.

Figure 1. All-cause rate of readmission, by principal diagnosis of index admission, 2009–2013



Note: Principal diagnosis grouped according to the Clinical Classifications Software (CCS)

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013 Nationwide Readmissions Database (NRD), and weighted national estimates from readmissions analysis files derived from the 2009–2012 State Inpatient Databases (SID)

- **The percentage of index stays with AMI that were readmitted for any cause within 30 days decreased by 13 percent from 2009 through 2013.**

  From 2009 through 2013, the rate of readmission following index stays for AMI decreased by 13 percent, from 16.9 to 14.7 per 100 index stays. By 2013, the readmission rate following AMI was only 6 percent higher than the overall readmission rate of 13.9 per 100 index stays (vs. 21 percent higher in 2009).

- **The rate of readmission for index stays with CHF or COPD decreased by 6 percent from 2009 through 2013.**

  From 2009 through 2013, the rate of readmission following index stays decreased by 6 percent for CHF (from 25.1 to 23.5 per 100 index stays) and for COPD (from 21.2 to 20.0 per 100 index stays).

The overall readmission rate and the readmission rate for pneumonia remained relatively stable from 2009 through 2013.

Table 2 presents trends in the 30-day all-cause readmission rate following index admissions for four high-volume conditions, by expected payer of the index stay, in 2009 and 2013.

Table 2. All-cause rate of readmission, by principal diagnosis and expected payer of the index stay, 2009–2013

Principal diagnosis for index hospital stay, by expected payer of the index stay	Number of all-cause readmissions		Rate of all-cause readmission		Cumulative percentage change in rate, 2009–2013
	2009	2013	2009	2013	
Total, all four conditions					
Total	571,393	496,502	19.7	18.6	–5.4
Expected payer of index stay					
Medicare	430,916	376,761	22.0	20.3	–7.9
Medicaid	64,000	57,064	19.8	20.5	3.5
Private	54,824	40,350	12.4	11.7	–5.8
Uninsured	13,473	12,627	11.5	11.0	–4.0
Acute myocardial infarction					
Total	79,199	71,300	16.9	14.7	–13.1
Expected payer of index stay					
Medicare	56,348	51,334	20.4	17.8	–12.8
Medicaid	5,962	5,683	19.9	17.7	–10.7
Private	12,475	9,652	10.4	8.5	–18.3
Uninsured	2,953	3,011	9.8	8.6	–12.9
Congestive heart failure					
Total	214,198	183,534	25.1	23.5	–6.6
Expected payer of index stay					
Medicare	168,791	144,138	25.6	23.7	–7.2
Medicaid	22,285	19,809	30.4	29.1	–4.1
Private	16,309	11,973	19.8	18.3	–7.7
Uninsured	4,218	4,096	17.6	16.5	–6.4
Chronic obstructive pulmonary disease					
Total	132,098	114,067	21.2	20.0	–5.4
Expected payer of index stay					
Medicare	100,243	86,112	22.2	20.6	–7.3
Medicaid	17,405	16,053	24.1	24.5	1.7
Private	9,364	7,041	13.9	13.7	–1.1
Uninsured	3,038	2,594	13.9	12.0	–14.0
Pneumonia					
Total	145,898	127,601	15.3	15.5	1.0
Expected payer of index stay					
Medicare	105,534	95,178	18.6	17.5	–5.6
Medicaid	18,348	15,519	12.4	13.7	10.6
Private	16,676	11,685	9.6	10.1	4.8
Uninsured	3,263	2,926	7.9	8.9	13.3

Note: Principal diagnosis grouped according to the Clinical Classifications Software (CCS). Data by payer do not add to the column total because other payers are not shown.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013 Nationwide Readmissions Database (NRD), and weighted national estimates from a readmissions analysis file derived from the 2009 State Inpatient Databases (SID)

- **In 2009 and 2013, index stays paid by Medicare accounted for over 75 percent of readmissions for AMI, CHF, COPD, and pneumonia, and had higher readmission rates than any other payer, except for Medicaid.**

  Of all readmissions following an index stay for AMI, CHF, COPD, or pneumonia, over 75 percent had Medicare as the expected payer for the index stay in both 2009 and 2013. The rate of readmission for any of these four high-volume conditions among index stays with Medicare as the expected payer was nearly twice the rate among index stays with private insurance (20.3 vs. 11.7 per 100 index stays in 2013). In 2013, the rate of readmission for these four conditions also was high among index stays with Medicaid (20.5); it was lowest among uninsured index stays (11.0).

- **The total rate of readmission associated with index stays for any of the four conditions examined decreased for all payers, except index stays paid by Medicaid.**

  The readmission rate among index stays for AMI, CHF, COPD, and pneumonia combined decreased by 7.9 percent for index stays paid by Medicare and by 5.8 percent for index stays paid by private insurance. The rate also decreased among uninsured index stays, although not by more than 5 percent. Medicaid was the only payer for which the readmission rate did not decrease from 2009 through 2013.

- **The readmission rate decreased by more than 5 percent for each of the four high-volume conditions for index stays paid by Medicare.**

  From 2009 through 2013, among index stays with Medicare as the expected payer, the rate of readmission decreased by 13 percent for AMI, by 7 percent each for CHF and COPD, and by 6 percent for pneumonia. Medicare was the only expected payer for which the rate of readmission decreased for all four conditions.

- **From 2009 through 2013, the rate of readmission following an index stay for AMI decreased by over 10 percent for all expected payers.**

  Private payers experienced the greatest decrease in the rate of readmission associated with AMI, by 18 percent, from 10.4 readmissions per 100 index stays in 2009 to 8.5 per 100 index stays in 2013. The rate of readmission following AMI decreased by 13 percent among index stays covered by Medicare and among uninsured index stays, and by 11 percent among index stays covered by Medicaid.

- **The rate of readmission following an index stay for CHF decreased by over 5 percent for all expected payers except Medicaid.**

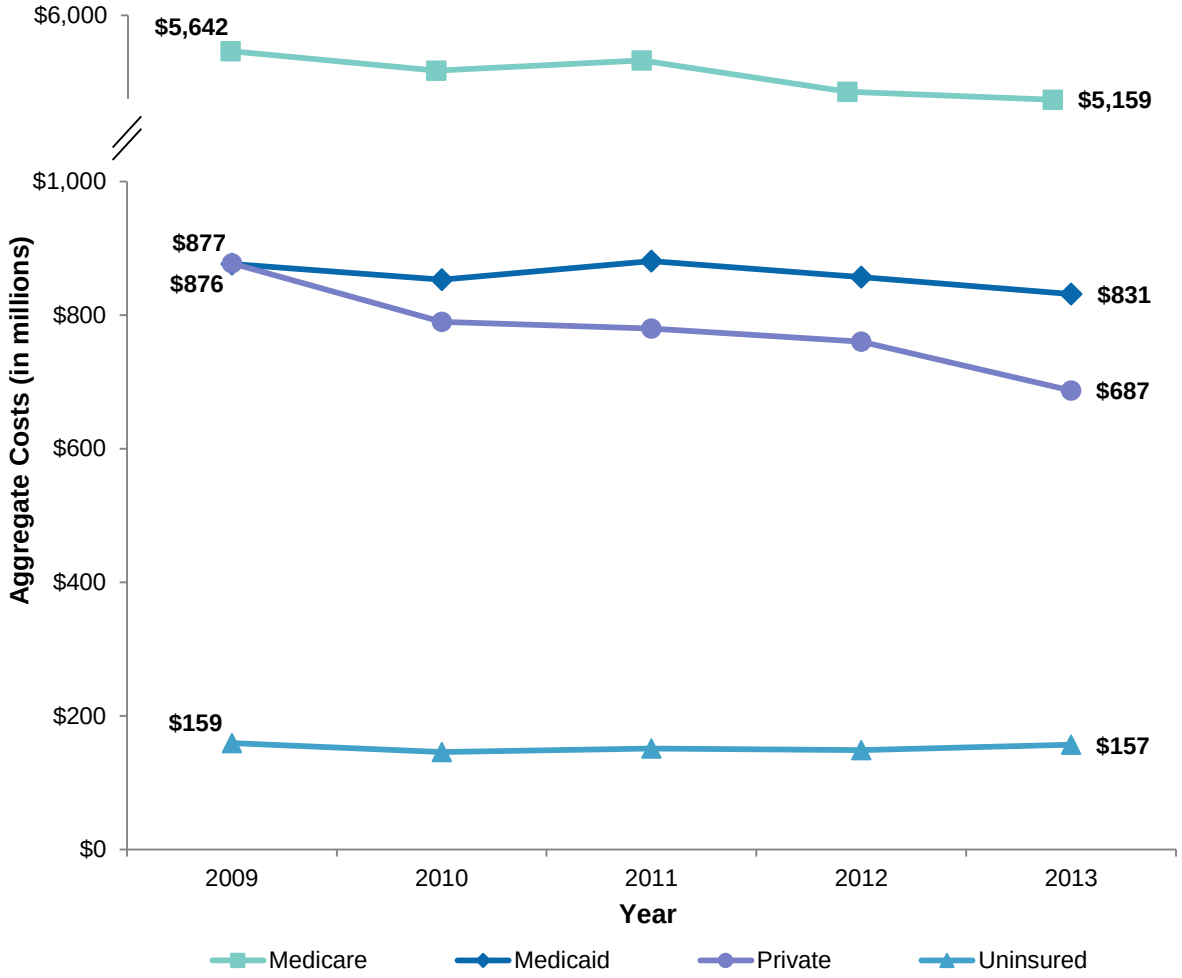
  The rate of readmission for CHF decreased by 8 percent among index stays covered by private insurance, by 7 percent among index stays with Medicare, and by 6 percent among uninsured index stays. The decrease in the CHF readmission rate was less than 5 percent for Medicaid.

- **From 2009 through 2013, the rate of readmission following an index stay for pneumonia increased by 13 percent for uninsured stays and by 11 percent for stays covered by Medicaid.**

  The rate of readmission following an index stay for pneumonia remained stable at around 15.5 per 100 index stays overall. However, of the four high-volume conditions examined, pneumonia was the only condition for which the readmission rate increased by over 5 percent for any payer. This increase was highest among uninsured index stays, from 7.9 readmissions per 100 index stays in 2009 to 8.9 per 100 index stays in 2013 (a 13 percent increase), followed by index stays with Medicaid as the expected payer (an 11 percent increase). Medicare was the only payer for which the readmission rate associated with pneumonia decreased (by 6 percent).

Figure 2 presents the inflation-adjusted aggregate costs for readmissions for four high-volume conditions, by expected payer of the index stay, from 2009 through 2013.

Figure 2. Inflation-adjusted aggregate costs for readmissions for any cause following an index stay for AMI, CHF, COPD, or pneumonia, by expected payer of the index stay, 2009–2013



Abbreviations: AMI, acute myocardial infarction; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disease

Notes: All costs are inflation adjusted using the price index for the gross domestic product and expressed in 2013 dollars. Costs include those of the readmission only, excluding the cost of the index stay.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013 Nationwide Readmissions Database (NRD), and weighted national estimates from readmissions analysis files derived from the 2009–2012 State Inpatient Databases (SID)

- **In 2013, the aggregate cost of readmissions for AMI, CHF, COPD, and pneumonia totaled $5.2 billion among index stays with Medicare.**

  Among index stays for AMI, CHF, COPD, and pneumonia with Medicare as the expected payer, the aggregate cost of readmissions, excluding the cost of the index stay, totaled $5.2 billion, more than 6 times the aggregate cost of readmissions for index stays with Medicaid or private insurance.

- **Overall, the aggregate cost of readmissions following an index stay for any of the four conditions decreased for all payers. The largest declines were among index stays paid by private insurance (22 percent) and by Medicare (9 percent).**

  From 2009 through 2013, the inflation-adjusted aggregate cost of readmissions among index stays for AMI, CHF, COPD, and pneumonia that were expected to be paid by private insurance decreased 22 percent, from $877 to $687 million. The aggregate cost of readmissions for these four conditions over the 5-year time period also decreased among index stays paid by Medicare (by 9 percent from $5,642 to $5,159 million) and among index stays paid by Medicaid (by 5 percent from $876 to $831 million). Aggregate costs remained relatively stable for uninsured index stays, decreasing by less than 5 percent.

Table 3 presents inflation-adjusted aggregate costs for readmissions for four high-volume conditions, by principal diagnosis and expected payer of the index stay, in 2009 and 2013.

Table 3. Inflation-adjusted aggregate costs of readmissions for four high-volume conditions, by principal diagnosis and expected payer of the index stay, 2009–2013

Principal diagnosis for index hospital stay, by expected payer of the index stay	Aggregate costs for readmissions, $ millions		Cumulative percentage change in aggregate costs, 2009–2013
	2009	2013	
Total, all four conditions			
Total	7,661.6	6,964.7	–9.1
Expected payer of index stay			
Medicare	5,642.3	5,158.6	–8.6
Medicaid	876.5	831.3	–5.2
Private	877.4	687.1	–21.7
Uninsured	159.2	156.8	–1.5
Acute myocardial infarction			
Total	1,098.3	1,043.4	–5.0
Expected payer of index stay			
Medicare	771.1	743.2	–3.6
Medicaid	83.8	86.9	3.6
Private	183.7	151.5	–17.6
Uninsured	38.2	39.7	4.0
Congestive heart failure			
Total	2,975.0	2,728.2	–8.3
Expected payer of index stay			
Medicare	2,249.6	2,055.9	–8.6
Medicaid	322.3	314.8	–2.3
Private	317.0	252.4	–20.4
Uninsured	50.9	56.2	10.4
Chronic obstructive pulmonary disease			
Total	1,572.3	1,383.6	–12.0
Expected payer of index stay			
Medicare	1,202.0	1,049.4	–12.7
Medicaid	198.3	189.2	–4.6
Private	120.2	94.3	–21.6
Uninsured	30.1	23.2	–22.9
Pneumonia			
Total	2,016.0	1,809.5	–10.2
Expected payer of index stay			
Medicare	1,419.6	1,310.1	–7.7
Medicaid	272.1	240.5	–11.6
Private	256.5	188.9	–26.4
Uninsured	40.0	37.7	–5.7

Notes: Principal diagnosis grouped according to the Clinical Classifications Software (CCS). All costs are inflation adjusted using the price index for the gross domestic product and expressed in 2013 dollars. Costs include those of the readmission only, excluding the cost of the index stay. Data by payer do not add to the column total because other payers are not shown.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013 Nationwide Readmissions Database (NRD), and weighted national estimates from a readmissions analysis file derived from the 2009 State Inpatient Databases (SID)

- **The aggregate cost of readmissions following an index stay for AMI decreased by 18 percent for index stays paid by private insurance.**

  The inflation-adjusted aggregate cost of readmissions following index stays for AMI with private insurance as the expected payer decreased from $183.7 to $151.5 million from 2009 through 2013 (by 18 percent). The aggregate cost of readmissions associated with AMI did not change by more than 5 percent for other expected payers.

- **The aggregate cost of readmissions for CHF decreased by 20 percent among index stays paid by private insurance and by 9 percent among those paid by Medicare.**

  From 2009 through 2013, the aggregate cost of readmissions following an index stay for CHF decreased by 20 percent among index stays with private insurance as the expected payer (from $317.0 to $252.4 million) and by 9 percent among index stays with Medicare as the expected payer (from $2,249.6 to $2,055.9 million). By contrast, aggregate costs for readmissions following an index stay for CHF increased by 10 percent among index stays with no insurance (from $50.9 to $56.2 million).

- **From 2009 through 2013, the aggregate cost of readmissions for COPD decreased by over 5 percent among all expected payers except Medicaid.**

  The aggregate cost of readmissions following an index stay for COPD decreased by 23 percent among uninsured index stays, by 22 percent among index stays with private insurance as the expected payer, and by 13 percent among index stays with Medicare as the expected payer. There was no substantial change in the aggregate cost of readmissions following index stays for COPD with Medicaid.

- **The aggregate cost of readmissions for pneumonia decreased by over 5 percent among all expected payers.**

  The aggregate cost of readmissions following an index stay for pneumonia decreased for all expected payers: by 26 percent among index stays paid by private insurance, by 12 percent among index stays paid by Medicaid, by 8 percent among index stays paid by Medicare, and by 6 percent among uninsured index stays.

- **Aggregate costs of readmissions following an index stay with private insurance decreased by more than 17 percent for each of the four high-volume conditions examined.**

  The aggregate cost of readmissions following an index stay with private insurance as the expected payer decreased between 18 and 26 percent for each of the four conditions examined (decrease of 18 percent for AMI, 20 percent for CHF, 22 percent for COPD, and 26 percent for pneumonia).

Data Source

The estimates in this Statistical Brief are based upon data from the Healthcare Cost and Utilization Project (HCUP) 2013 Nationwide Readmissions Database (NRD) and the 2009–2012 State Inpatient Databases (SID). The SID were used to create readmissions analysis files consistent with the design of the 2013 NRD and weighted for national estimates. The statistics were generated from HCUPnet, a free, online query system that provides users with *immediate access* to the largest set of publicly available, all-payer national, regional, and State-level hospital care databases from HCUP.[8]

Definitions

Diagnoses, ICD-9-CM, and Clinical Classifications Software (CCS)
The *principal diagnosis* is that condition established after study to be chiefly responsible for the patient's admission to the hospital. *Secondary diagnoses* are concomitant conditions that coexist at the time of admission or develop during the stay.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are approximately 14,000 ICD-9-CM diagnosis codes.

CCS categorizes ICD-9-CM diagnosis codes into a manageable number of clinically meaningful categories.[9] This clinical grouper makes it easier to quickly understand patterns of diagnoses. CCS categories identified as Other typically are not reported; these categories include miscellaneous, otherwise unclassifiable diagnoses that may be difficult to interpret as a group.

High-volume conditions
The four high-volume conditions examined in this Statistical Brief were identified using the following CCS codes based on the principal diagnosis:

- Acute myocardial infarction (AMI): CCS 100
- Congestive heart failure (CHF): CCS 108
- Chronic obstructive pulmonary disease (COPD): CCS 127
- Pneumonia: CCS 122

These conditions were chosen because they are used to calculate readmission rates and penalty payment adjustments by the Centers for Medicare & Medicaid Services (CMS) Hospital Readmissions Reduction Program (HRRP). The HRRP also considers readmissions for index stays involving hip and knee replacements, which we did not examine in this Statistical Brief because these types of stays are identified using procedure rather than diagnosis codes.

It should be noted that our estimates may differ from Medicare readmission rates computed using other data sources. The CMS HRRP uses a different algorithm to identify conditions.[10] There may also be differences in the inclusion of beneficiaries with Medicare fee-for-service or Medicare Advantage and beneficiaries dually enrolled in Medicare and Medicaid. These groups are included in the Medicare estimates in this Statistical Brief. As shown in Table 4, despite these potential differences the rates of readmission following index stays for AMI, CHF, and pneumonia that were expected to be paid by Medicare, as reported in this Statistical Brief using HCUP data, are consistent with an analysis conducted by the Kaiser Family Foundation[11] using CMS Hospital Compare data (the latter did not report COPD readmission rates).

[8] Agency for Healthcare Research and Quality. HCUPnet Web site. http://hcupnet.ahrq.gov/. Accessed June 29, 2015.
[9] HCUP Clinical Classifications Software (CCS). Healthcare Cost and Utilization Project (HCUP). Healthcare Cost and Utilization Project. Rockville, MD: Agency for Healthcare Research and Quality. Updated November 2014. http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp. Accessed January 7, 2015.
[10] Centers for Medicare & Medicaid Services. Measure Methodology. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/Measure-Methodology.html. Accessed October 1, 2015.
[11] Boccuti C, Casillas G. Aiming for Fewer Hospital U-turns: The Medicare Hospital Readmissions Reduction Program. Menlo Park, CA: The Henry J. Kaiser Family Foundation; January 2015. http://kff.org/medicare/issue-brief/aiming-for-fewer-hospital-u-turns-the-medicare-hospital-readmission-reduction-program/. Accessed October 1, 2015.

Table 4. A comparison of Medicare readmission rates following index stays for AMI, CHF, and pneumonia for 2008–2013 published by the Kaiser Family Foundation with those for 2009 and 2013 from HCUP

Condition	KFF national average Medicare readmission rate, %		HCUP national Medicare readmission rate, %	
	2008–2011	2010–2013	2009	2013
AMI	19.7	17.8	20.4	17.8
CHF	24.7	22.7	25.6	23.7
Pneumonia	18.5	17.3	18.6	17.5

Abbreviations: AMI, acute myocardial infarction; CHF, congestive heart failure; KFF, Kaiser Family Foundation

Source: Kaiser Family Foundation analysis of Centers for Medicare & Medicaid Services Hospital Compare data files; Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), 2013 Nationwide Readmissions Database (NRD), and weighted national estimates from a readmissions analysis file derived from the 2009 State Inpatient Databases (SID)

Readmissions

The 30-day readmission rate is defined as the number of admissions for each condition for which there was at least one subsequent hospital admission within 30 days, divided by the total number of admissions from January through November of the same year. That is, when patients are discharged from the hospital, they are followed for 30 days in the data. If any readmission to the same or different hospital occurs during this time period, the admission is counted as having a readmission. No more than one readmission is counted within the 30-day period, because the outcome measure assessed is "percentage of admissions that are readmitted." If a patient was transferred to a different hospital on the same day or was transferred within the same hospital, the two events were combined as a single stay and the second event was not counted as a readmission; that is, transfers were not considered a readmission. In the case of admissions for which there was more than one readmission in the 30-day period, the data presented in this Statistical Brief reflect the characteristics and costs of the first readmission.

Every qualifying hospital stay is counted as a separate initial (starting point) admission. Thus, a single patient can be counted multiple times during the course of the January through November observation period. In addition, initial admissions do not require a prior "clean period" with no hospitalizations; that is, a hospital stay may be a readmission for a prior stay and the initial admission for a subsequent readmission. Admissions were disqualified from the analysis as initial admissions if they could not be followed for 30 days for one of the following reasons: (1) the patient died in the hospital, (2) information on length of stay was missing, or (3) the patient was discharged in December.

Types of hospitals included in the HCUP Nationwide Readmissions Database

The Nationwide Readmissions Database (NRD) is based on data from community hospitals, which are defined as short-term, non-Federal, general, and other hospitals, excluding hospital units of other institutions (e.g., prisons). The NRD includes obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded are long-term care facilities such as rehabilitation, long-term acute care, psychiatric, and alcoholism and chemical dependency hospitals. However, if a patient received long-term care, rehabilitation, or treatment for psychiatric or chemical dependency conditions in a community hospital, the discharge record for that stay will be included in the NRD.

Types of hospitals included in HCUP State Inpatient Databases

This analysis used State Inpatient Databases (SID) limited to data from community hospitals, which are defined as short-term, non-Federal, general, and other hospitals, excluding hospital units of other institutions (e.g., prisons). Community hospitals include obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded for this analysis are long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. However, if a patient received long-term care, rehabilitation, or treatment for psychiatric or chemical dependency conditions in a community hospital, the discharge record for that stay was included in the analysis.

Costs and charges
Total hospital charges were converted to costs using HCUP Cost-to-Charge Ratios based on hospital accounting reports from CMS.[12] *Costs* reflect the actual expenses incurred in the production of hospital services, such as wages, supplies, and utility costs; *charges* represent the amount a hospital billed for the case. For each hospital, a hospital-wide cost-to-charge ratio is used. Hospital charges reflect the amount the hospital billed for the entire hospital stay and do not include professional (physician) fees. For the purposes of this Statistical Brief, costs are reported to the nearest hundred thousand.

Annual costs were inflation adjusted using the Gross Domestic Product (GDP) Price Index from the U.S. Department of Commerce, Bureau of Economic Analysis (BEA), with 2013 as the index base.[13] That is, all costs are expressed in 2013 dollars.

How HCUP estimates of costs differ from National Health Expenditure Accounts
There are a number of differences between the costs cited in this Statistical Brief and spending as measured in the National Health Expenditure Accounts (NHEA), which are produced annually by CMS.[14] The largest source of difference comes from the HCUP coverage of inpatient treatment only in contrast to the NHEA inclusion of outpatient costs associated with emergency departments and other hospital-based outpatient clinics and departments as well. The outpatient portion of hospitals' activities has been growing steadily and may exceed half of all hospital revenue in recent years. On the basis of the American Hospital Association Annual Survey, 2012 outpatient gross revenues (or charges) were about 44 percent of total hospital gross revenues.[15]

Smaller sources of differences come from the inclusion in the NHEA of hospitals that are excluded from HCUP. These include Federal hospitals (Department of Defense, Veterans Administration, Indian Health Services, and Department of Justice [prison] hospitals) as well as psychiatric, substance abuse, and long-term care hospitals. A third source of difference lies in the HCUP reliance on billed charges from hospitals to payers, adjusted to provide estimates of costs using hospital-wide cost-to-charge ratios, in contrast to the NHEA measurement of spending or revenue. HCUP costs estimate the amount of money required to produce hospital services, including expenses for wages, salaries, and benefits paid to staff as well as utilities, maintenance, and other similar expenses required to run a hospital. NHEA spending or revenue measures the amount of income received by the hospital for treatment and other services provided, including payments by insurers, patients, or government programs. The difference between revenues and costs include profit for for-profit hospitals or surpluses for nonprofit hospitals.

Payer
Payer is the expected payer for the hospital stay. To make coding uniform across all HCUP data sources, payer combines detailed categories into general groups:

- Medicare: includes patients covered by fee-for-service and managed care Medicare
- Medicaid: includes patients covered by fee-for-service and managed care Medicaid
- Private Insurance: includes Blue Cross, commercial carriers, and private health maintenance organizations (HMOs) and preferred provider organizations (PPOs)
- Uninsured: includes an insurance status of *self-pay* and *no charge*
- Other: includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.

Hospital stays billed to the State Children's Health Insurance Program (SCHIP) may be classified as Medicaid, Private Insurance, or Other, depending on the structure of the State program. Because most

[12] Agency for Healthcare Research and Quality. HCUP Cost-to-Charge Ratio (CCR) Files. Healthcare Cost and Utilization Project (HCUP). 2001–2011. Rockville, MD: Agency for Healthcare Research and Quality, Rockville, MD. Updated December 2014. http://www.hcup-us.ahrq.gov/db/state/costtocharge.jsp. Accessed January 7, 2015.
[13] U.S. Bureau of Economic Analysis. National Income and Product Account Tables, Table 1.1.4 Price Indexes for Gross Domestic Product. http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=1&isuri=1. Accessed October 13, 2015.
[14] For additional information about the NHEA, see Centers for Medicare & Medicaid Services (CMS). National Health Expenditure Data. CMS Web site May 2014. http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html?redirect=/NationalHealthExpendData/. Accessed January 7, 2015.
[15] American Hospital Association. TrendWatch Chartbook, 2014. Table 4.2. Distribution of Inpatient vs. Outpatient Revenues, 1992–2012. http://www.aha.org/research/reports/tw/chartbook/2014/table4-2.pdf. Accessed January 7, 2015.

State data do not identify SCHIP patients specifically, it is not possible to present this information separately.

For this Statistical Brief a hierarchy was used to assign the payer category based on the primary and secondary expected payer:[16]

- If the primary or secondary expected payer indicates Medicare, then the payer category is assigned to Medicare. This categorization includes patients who are dually eligible for Medicare and Medicaid under Medicare.
- If not Medicare and the primary or secondary expected payer indicates Medicaid, then the payer category is Medicaid.
- If not Medicare or Medicaid and the primary or secondary expected payer indicates private insurance, then the payer category is private.
- If not Medicare, Medicaid, or private and the primary expected payer indicates self-pay or no charge, then the payer category is uninsured.
- Stays for other types of payers are not reported in this Statistical Brief because this is a mixed payer group and small numbers.

For this Statistical Brief, categorization of readmission counts and costs by expected payer was based on the index stay. The concordance between the expected payer coded at the index stay and the expected payer coded at readmission varies by payer: 98 percent for Medicare, 95 percent for Medicaid, 93 percent for private, and 80 percent for uninsured (percentages based on the 2013 NRD).

About HCUP

The Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP databases bring together the data collection efforts of State data organizations, hospital associations, and private data organizations (HCUP Partners), and the Federal government to create a national information resource of encounter-level health care data. HCUP includes the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to health care programs, and outcomes of treatments at the national, State, and local market levels.

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning and Development
Colorado Hospital Association
Connecticut Hospital Association
District of Columbia Hospital Association
Florida Agency for Health Care Administration
Georgia Hospital Association
Hawaii Health Information Corporation
Illinois Department of Public Health
Indiana Hospital Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services

[16] The 2013 NRD available for purchase through the HCUP Central Distributor includes the data element for the primary expected payer but not the data element for the secondary expected payer.

Louisiana Department of Health and Hospitals
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Center for Health Information and Analysis
Michigan Health & Hospital Association
Minnesota Hospital Association
Mississippi Department of Health
Missouri Hospital Industry Data Institute
Montana MHA - An Association of Montana Health Care Providers
Nebraska Hospital Association
Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health
New Mexico Department of Health
New York State Department of Health
North Carolina Department of Health and Human Services
North Dakota (data provided by the Minnesota Hospital Association)
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Oregon Office of Health Analytics
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Budget & Control Board
South Dakota Association of Healthcare Organizations
Tennessee Hospital Association
Texas Department of State Health Services
Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association

About Statistical Briefs

HCUP Statistical Briefs are descriptive summary reports presenting statistics on hospital inpatient and emergency department use and costs, quality of care, access to care, medical conditions, procedures, patient populations, and other topics. The reports use HCUP administrative health care data.

About the NRD

The HCUP Nationwide Readmissions Database (NRD) is a calendar-year, discharge-level database constructed from the HCUP State Inpatient Databases (SID) with verified patient linkage numbers that can be used to track a person across hospitals within a State. The 2013 NRD is available for purchase through the HCUP Central Distributor. The NRD is designed to support various types of analyses of national readmission rates. The database includes discharges for patients with and without repeat hospital visits in a year and those who have died in the hospital. Repeat stays may or may not be related. The criteria to determine the relationship between hospital admissions is left to the analyst using the NRD. The NRD was constructed as a sample of convenience consisting of 100 percent of the eligible discharges. Discharge weights for national estimates are developed using the target universe of community hospitals (excluding rehabilitation and long-term acute care hospitals) in the United States. Over time, the sampling frame for the NRD will change; thus, the number of States contributing to the NRD will vary from year to year. The NRD is intended for national estimates only; no regional, State-, or hospital-specific estimates can be produced.

About the SID

The HCUP State Inpatient Databases (SID) are hospital inpatient databases from data organizations participating in HCUP. The SID contain the universe of the inpatient discharge abstracts in the participating HCUP States, translated into a uniform format to facilitate multistate comparisons and analyses. Together, the SID encompass more than 95 percent of all U.S. community hospital discharges. The SID can be used to investigate questions unique to one State, to compare data from two or more States, to conduct market-area variation analyses, and to identify State-specific trends in inpatient care utilization, access, charges, and outcomes.

About HCUPnet

HCUPnet is an online query system that offers instant access to the largest set of all-payer health care databases that are publicly available. HCUPnet has an easy step-by-step query system that creates tables and graphs of national and regional statistics as well as data trends for community hospitals in the United States. HCUPnet generates statistics using data from HCUP's National (Nationwide) Inpatient Sample (NIS), the Kids' Inpatient Database (KID), the Nationwide Emergency Department Sample (NEDS), the Nationwide Readmissions Database (NRD), the State Inpatient Databases (SID), and the State Emergency Department Databases (SEDD).

For More Information

For more information about HCUP, visit http://www.hcup-us.ahrq.gov/.

For additional HCUP statistics, visit HCUPnet, our interactive query system, at http://hcupnet.ahrq.gov/.

For information on other hospitalizations in the United States, refer to the following HCUP Statistical Briefs located at http://www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp:

- Statistical Brief #180, Overview of Hospital Stays in the United States, 2012
- Statistical Brief #181, Costs for Hospital Stays in the United States, 2012
- Statistical Brief #186, Most Frequent Operating Room Procedures Performed in U.S. Hospitals, 2003–2012
- Statistical Brief #162, Most Frequent Conditions in U.S. Hospitals, 2011

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of health care in the United States. We also invite you to tell us how you are using this Statistical Brief and other HCUP data and tools, and to share suggestions on how HCUP products might be enhanced to further meet your needs. Please e-mail us at hcup@ahrq.gov or send a letter to the address below:

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