

## STATISTICAL BRIEF #154

April 2013

### Readmissions to U.S. Hospitals by Procedure, 2010

Audrey J. Weiss, Ph.D., Anne Elixhauser, Ph.D., and Claudia Steiner, M.D., M.P.H.

#### Introduction

Readmissions—revisits to the hospital within a certain time frame following an initial inpatient stay—are receiving increasing attention as a measure of quality of care and a potential source for reducing healthcare costs.<sup>1</sup> Although not all rehospitalizations can be prevented, many readmissions could be avoided with improvements in the quality of hospital care provided during, transitioning from, and following the inpatient stay.

Research indicates that nearly one in five Medicare patients are readmitted to the hospital within 30 days, about 90 percent of these readmissions are unplanned, and the costs to Medicare are more than \$17 billion.<sup>2</sup> The Patient Protection and Affordable Care Act (Section 3025) mandates a hospital readmissions reduction program whereby Medicare payments will be reduced for hospitals with excessive readmissions.<sup>3</sup>

Prior research has offered select views of readmissions for general surgery<sup>4</sup> or high-risk surgery,<sup>5</sup> and some studies have focused on readmissions for specific surgical procedures such as percutaneous coronary intervention (PCI/PTCA).<sup>6,7</sup> However, relatively limited information is available about readmissions by procedure. This Statistical Brief provides an overview of 30-day all-payer, all-cause readmissions to U.S. hospitals for a range of inpatient

#### Highlights

- Among patients with the most common procedures in U.S. hospitals, as many as one in five were readmitted within 30 days. For example, 22.8 percent of patients undergoing amputation of a lower extremity; 19.1 percent of patients undergoing debridement of a wound, infection, or burn; and 18.5 percent of patients receiving heart valve procedures were readmitted.
- Readmission rates were even higher for some less frequent procedures—nearly one in three in some cases. The highest 30-day readmission rates were for kidney transplant (29.1 percent) and ileostomy and other enterostomy (29.1 percent). For some procedures, about one in four patients were readmitted within 30 days: procedures to create access for hemodialysis (27.4 percent), nephrotomy and nephrostomy (24.0 percent), and tracheostomy (23.9 percent).
- For common procedures having 15 percent or higher readmission rates, patients aged 65 years and older consistently had the highest readmission rates.
- For these same procedures, Medicaid as well as Medicare readmission rates consistently were higher than rates for privately insured and uninsured patients.

<sup>1</sup> Stone J, Hoffman GJ. Medicare Hospital Readmissions: Issues, Policy Options and PPACA. 2010. Congressional Research Service Report for Congress. [http://www.hospitalmedicine.org/AM/pdf/advocacy/CRS\\_Readmissions\\_Report.pdf](http://www.hospitalmedicine.org/AM/pdf/advocacy/CRS_Readmissions_Report.pdf). Accessed April 3, 2013.

<sup>2</sup> Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare Fee-for-Service Program. *N Engl J Med*. 2009;360:1418-28.

<sup>3</sup> Public Law 111-148, Patient Protection and Affordable Care Act 2010: Part III, Section 33025. March 2010. <http://www.gpo.gov/fdsys/pkg/PLAW-111publ148/pdf/PLAW-111publ148.pdf>. Accessed April 3, 2013.

<sup>4</sup> Kassir MT, Owen RM, Perez SD, et al. Risk factors for 30-day hospital readmission among general surgery patients. *J Am Coll Surg*. 2012;215:322-30.

<sup>5</sup> Goodney PP, Stukel TA, Lucas FL, et al. Hospital volume, length of stay, and readmission rates in high-risk surgery. *Ann Surg*. 2003;238:161-7.

<sup>6</sup> Khawaja FJ, Shah ND, Lennon RJ, et al. Factors associated with 30-day readmission rates after percutaneous coronary intervention. *Arch Intern Med*. 2012;172:112-7.

<sup>7</sup> Meadows ES, Bae JP, Zagar A, et al. Rehospitalization following percutaneous coronary intervention for commercially insured patients with acute coronary syndrome: A retrospective analysis. *BMC Research Notes*. 2012;5:342. <http://www.biomedcentral.com/1756-0500/5/342>. Accessed April 3, 2013.

procedures in 2010. It presents the most comprehensive national estimates on readmissions by procedure that is available to date.

In this Statistical Brief, *readmission* was defined as a subsequent hospital admission within 30 days following an original admission (or index stay) with a major operating room procedure that occurred from January through November 2010. All-cause readmissions were examined; thus, readmissions may or may not include procedures that were listed during the index stay. Readmissions were tracked across the same or different hospitals. Some readmissions may be planned or unavoidable—no attempt was made to remove these types of readmissions from the analysis.

Readmission rates using Healthcare Cost and Utilization Project (HCUP) data are provided for the most frequent procedures treated in U.S. hospitals during 2010 and for the procedures with the highest readmission rates. All estimates were taken from HCUPnet, the online query system that provides free access to information from HCUP.<sup>8</sup> For a subset of procedures, readmission rates are presented by age group and expected primary payer (insurance status). Patients younger than 1 year were excluded from this analysis. Readmission rates were calculated without risk adjustment.

Appendix A provides detailed information on readmission rates for most procedures performed in U.S. hospitals in 2010. The table provides information on the number of index stays for each procedure, the number of all-cause readmissions within 30 days, and the percentage of index stays that were followed by a readmission within 30 days for any cause. Excluded were nonspecific procedures and any procedures with fewer than 5,000 index stays or fewer than 500 readmissions. In general, procedures are organized by body system in this table.

## Findings

### *Readmission rates for the most frequent procedures*

Table 1 lists the 30 most frequent procedures performed in U.S. hospitals, with their 30-day readmission rates. Readmission rates for these high-volume procedures varied from a low of 2.0 percent (Cesarean section and ligation of fallopian tubes) to a high of 22.8 percent (amputation of a lower extremity). The most frequent procedures and their readmission rates were Cesarean section (2.0 percent), knee arthroplasty (5.0 percent), percutaneous coronary angioplasty (12.9 percent), laminectomy (6.7 percent), and spinal fusion (6.8 percent).

Among the most frequent procedures, as many as one in five patients were readmitted within 30 days. The highest readmission rates were for amputation of a lower extremity (22.8 percent); debridement of a wound, infection, or burn (19.1 percent); heart valve procedures (18.5 percent); and small bowel resection (18.1 percent). The lowest readmission rates were for procedures related to childbirth and the reproductive organs (Cesarean section, 2.0 percent; ligation of fallopian tubes, 2.0 percent; repair of cystocele and rectocele, obliteration of vaginal vault, 2.6 percent) or genitourinary incontinence (3.0 percent).

### *Procedures with the highest readmission rates*

Table 2 lists procedures ranked by the highest readmission rates. Diagnostic procedures (e.g., exploratory surgery, biopsy) and nonspecific categories are excluded from this table. Diagnostic procedures are included in the Appendix.

Across all inpatient procedures, 30-day readmission rates reached a high of almost one in three patients for kidney transplant (29.1 percent) and ileostomy and other enterostomy (29.1 percent). Three other procedures—those to create access for hemodialysis (27.4 percent), nephrotomy and nephrostomy (24.0 percent), and tracheostomy (23.9 percent)—had readmission rates of approximately one in four patients.

---

<sup>8</sup> <http://hcupnet.ahrq.gov>

**Table 1. All-cause 30-day readmissions ranked by the most frequent procedures\* performed during the index stay, U.S. hospitals, 2010**

Rank	All-listed procedure for index hospital stay**	Number of index stays	30-day all-cause readmissions	
			Number of readmissions	Percent readmitted
1	Cesarean section	1,209,422	24,281	2.0
2	Arthroplasty knee	651,965	32,764	5.0
3	Percutaneous coronary angioplasty (PTCA)	603,446	78,038	12.9
4	Laminectomy, excision intervertebral disc	456,664	30,383	6.7
5	Spinal fusion	431,577	29,326	6.8
6	Hip replacement, total and partial	424,408	34,265	8.1
7	Cholecystectomy and common duct	419,433	39,774	9.5
8	Hysterectomy, abdominal and vaginal	409,674	19,446	4.7
9	Excision, lysis peritoneal adhesions	342,425	42,126	12.3
10	Appendectomy	315,034	18,835	6.0
11	Partial excision bone	307,221	30,810	10.0
12	Colorectal resection	294,071	43,388	14.8
13	Oophorectomy, unilateral and bilateral	288,228	17,480	6.1
14	Treatment, fracture or dislocation of hip and femur	278,118	33,049	11.9
15	Ligation of fallopian tubes	238,190	4,819	2.0
16	Coronary artery bypass graft (CABG)	234,840	35,484	15.1
17	Treatment, fracture or dislocation of lower extremity (other than hip or femur)	194,033	15,816	8.2
18	Insertion, revision, replacement, removal of cardiac pacemaker or cardioverter/defibrillator	149,147	23,057	15.5
19	Debridement of wound, infection or burn	148,544	28,394	19.1
20	Intraoperative cholangiogram	134,934	11,551	8.6
21	Amputation of lower extremity	124,880	28,488	22.8
22	Heart valve procedures	110,615	20,502	18.5
23	Incision and excision of the central nervous system (CNS)	105,700	17,019	16.1
24	Skin graft	97,756	14,789	15.1
25	Endarterectomy, vessel of head and neck	96,711	9,233	9.5
26	Repair of cystocele and rectocele, obliteration of vaginal vault	95,703	2,487	2.6
27	Transurethral excision, drainage, or removal urinary obstruction	88,139	11,795	13.4
28	Small bowel resection	83,157	15,050	18.1
29	Lobectomy or pneumonectomy	82,264	9,431	11.5
30	Genitourinary incontinence procedures	78,767	2,327	3.0

Source: Weighted national estimates from a readmissions analysis file derived from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), 2010, Agency for Healthcare Research and Quality (AHRQ).

\* Information is provided for procedures with at least 5,000 weighted occurrences and 500 or more weighted readmissions. See text and Definitions for details on methods for calculating readmissions.

\*\* Clinical Classification Software (CCS) label. Excludes diagnostic and nonspecific CCS categories. See Appendix for additional descriptions of the CCS categories.

**Table 2. All-cause 30-day readmissions ranked by the highest readmission rates for procedures\* performed during the index stay, U.S. hospitals, 2010**

Rank	All-listed procedure for index hospital stay**	Number of index stays	30-day all-cause readmissions	
			Number of readmissions	Percent readmitted
1	Kidney transplant	16,761	4,882	29.1
2	Ileostomy and other enterostomy (except colostomy)	23,392	6,811	29.1
3	Procedures to create access for hemodialysis	49,982	13,682	27.4
4	Nephrotomy and nephrostomy	43,773	10,508	24.0
5	Tracheostomy, temporary and permanent	9,335	2,234	23.9
6	Amputation of lower extremity	124,880	28,488	22.8
7	Bone marrow transplant	12,919	2,905	22.5
8	Embolectomy and endarterectomy of lower limbs	44,584	9,387	21.1
9	Peripheral vascular bypass	72,529	15,005	20.7
10	Insertion, replacement, or removal of extracranial ventricular shunt	32,957	6,633	20.1
11	Debridement of wound, infection or burn	148,544	28,394	19.1
12	Incision of pleura, thoracentesis, chest drainage	13,933	2,648	19.0
13	Colostomy, temporary and permanent	46,675	8,859	19.0
14	Heart valve procedures	110,615	20,502	18.5
15	Small bowel resection	83,157	15,050	18.1
16	Procedures on spleen	23,600	4,162	17.6
17	Incision and excision of the central nervous system (CNS)	105,700	17,019	16.1
18	Insertion, revision, replacement, removal of cardiac pacemaker or cardioverter/defibrillator	149,147	23,057	15.5
19	Skin graft	97,756	14,789	15.1
20	Coronary artery bypass graft (CABG)	234,840	35,484	15.1
21	Colorectal resection	294,071	43,388	14.8
22	Gastrectomy, partial and total	34,551	4,728	13.7
23	Excision of skin lesion	7,404	1,007	13.6
24	Transurethral excision, drainage, or removal urinary obstruction	88,139	11,795	13.4
25	Aortic resection, replacement or anastomosis	46,861	6,116	13.1
26	Percutaneous coronary angioplasty (PTCA)	603,446	78,038	12.9
27	Excision, lysis peritoneal adhesions	342,425	42,126	12.3
28	Treatment, fracture or dislocation of hip and femur	278,118	33,049	11.9
29	Lobectomy or pneumonectomy	82,264	9,431	11.5
30	Hemorrhoid procedures	9,298	1,020	11.0

Source: Weighted national estimates from a readmissions analysis file derived from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), 2010, Agency for Healthcare Research and Quality (AHRQ).

\* Information is provided for procedures with at least 5,000 weighted occurrences and 500 or more weighted readmissions. See text and Definitions for details on methods for calculating readmissions.

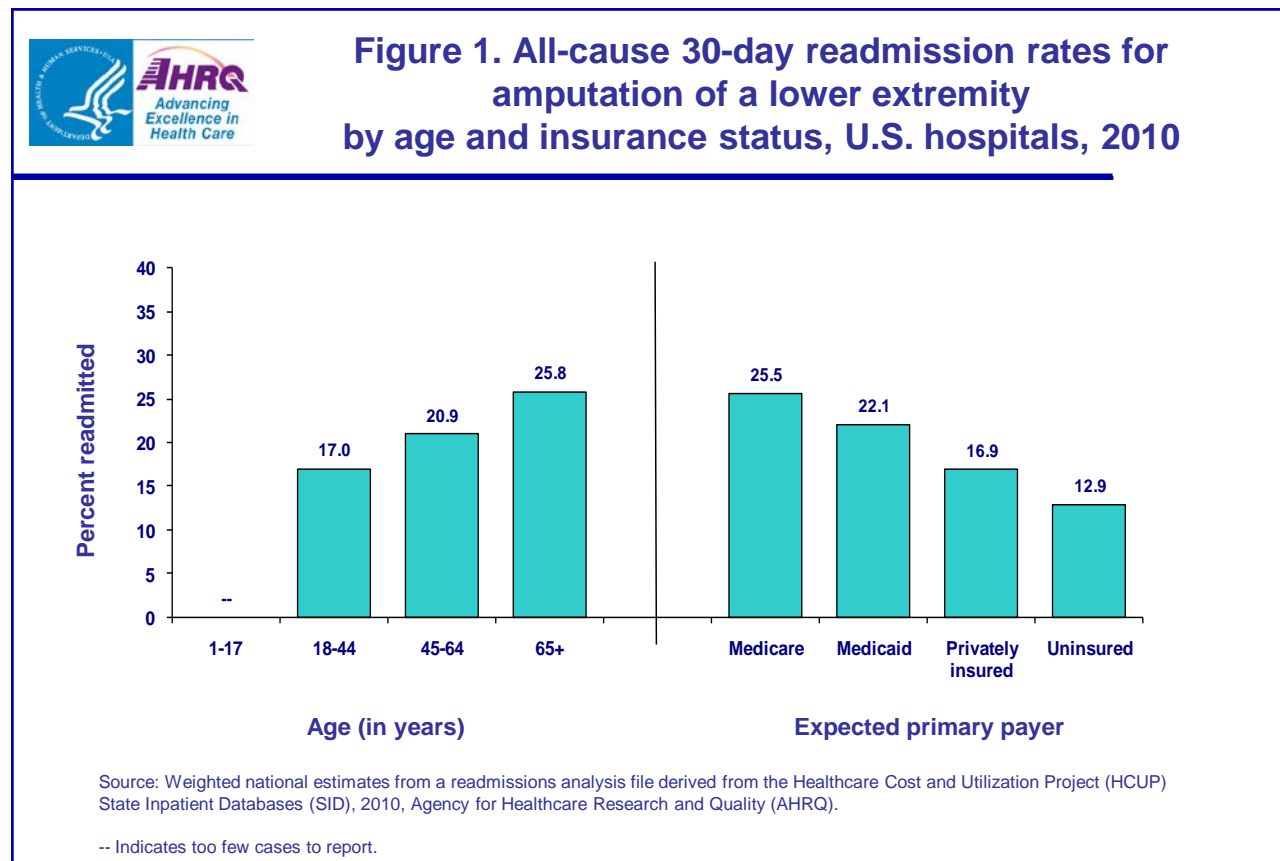
\*\* Clinical Classification Software (CCS) label. Excludes diagnostic and nonspecific CCS categories. See Appendix for additional descriptions of the CCS categories.

Among the 30 procedures with the highest readmission rates, 14 of them also are among the 30 most frequent procedures performed in the U.S. Percutaneous coronary angioplasty (78,038 patients; 12.9 percent readmission rate) has the 26<sup>th</sup> highest readmission rate and is the 3<sup>rd</sup> most common procedure. Colorectal resection (43,388 patients; 14.8 percent readmission rate) has the 21<sup>st</sup> highest readmission rate and is the 12<sup>th</sup> most common procedure. Excision or lysis of peritoneal adhesions (42,126 patients; 12.3 percent readmission rate) has the 27<sup>th</sup> highest readmission rate and is the 9<sup>th</sup> most common procedure. CABG (35,484 patients; 15.1 percent readmission rate) has the 20<sup>th</sup> highest readmission rate and is the 16<sup>th</sup> most common procedure. Treatment of hip/femur fracture (33,049 patients; 11.9 percent readmission rate) has the 28<sup>th</sup> highest readmission rate and is the 17<sup>th</sup> most common procedure.

*Readmission rates by age and insurance status for selected procedures*

Figures 1–6 provide details on 30-day all-cause readmission rates for the six procedures from Table 2 that involved more than 100,000 index stays and had overall readmission rates of at least 15 percent.

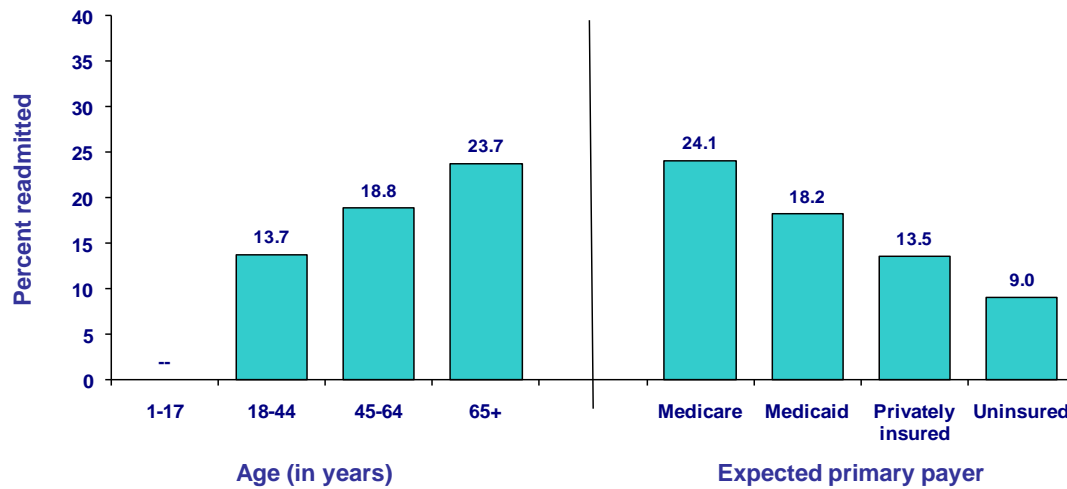
Figure 1 depicts readmission rates for amputation of a lower extremity. Readmission rates increased with age, ranging from 17.0 percent among patients aged 18–44 years to 25.8 percent among patients aged 65 years and older. The highest readmission rate was seen for patients with a primary expected payer of Medicare (25.5 percent) compared to 22.1 percent for Medicaid-covered patients, 16.9 percent for privately insured patients, and 12.9 percent for the uninsured.



Readmission rates for debridement of a wound, infection, or burn are shown in figure 2. Readmission rates progressively were higher with advancing age, increasing from 13.7 percent for 18–44 year olds to 23.7 percent for those aged 65 years and older. The readmission rate was highest for Medicare-covered patients (24.1 percent). The readmission rate for Medicaid-covered patients was 18.2 percent and for privately insured patients it was 13.5 percent, whereas for uninsured patients it was only 9.0 percent.



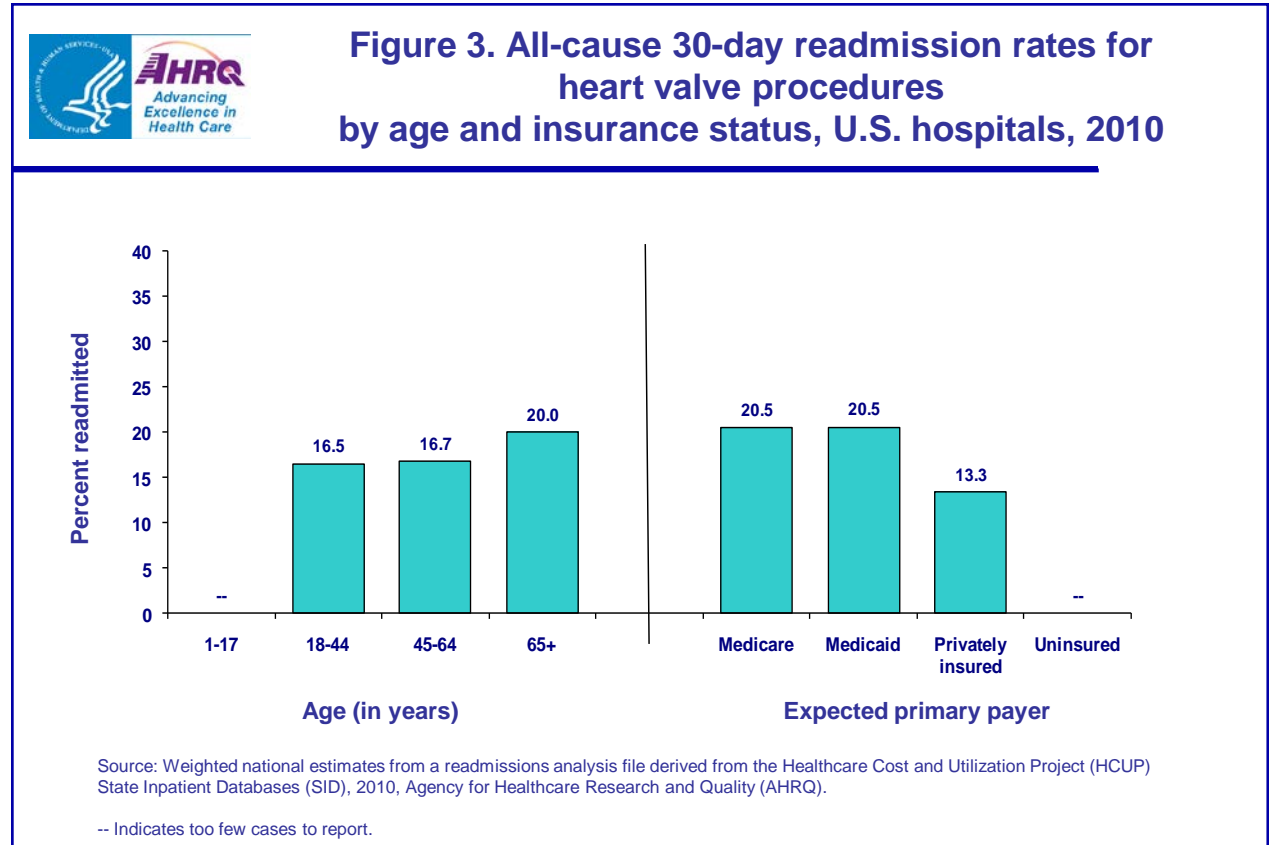
**Figure 2. All-cause 30-day readmission rates for debridement of a wound, infection, or burn by age and insurance status, U.S. hospitals, 2010**



Source: Weighted national estimates from a readmissions analysis file derived from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), 2010, Agency for Healthcare Research and Quality (AHRQ).

-- Indicates too few cases to report.

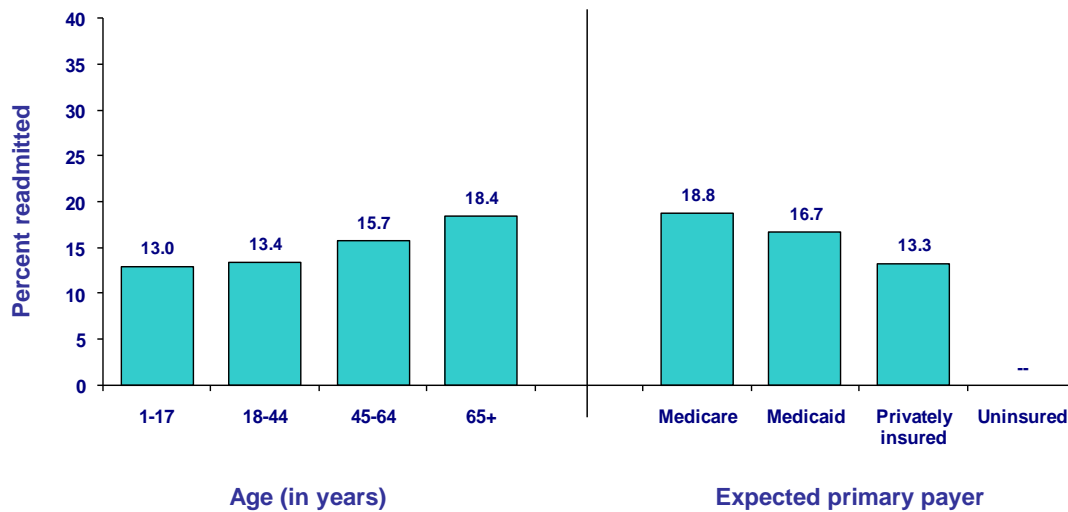
Figure 3 shows readmission rates for heart valve procedures. Readmission rates were highest for those aged 65 years and older (20.0 percent) and lower for those in the two younger age groups (16.5–16.7 percent). Readmission rates were identical for patients with a primary expected payer of Medicare or Medicaid (20.5 percent), which was more than 50 percent higher than for privately insured patients (13.3 percent).



Readmission rates for incision and excision of the central nervous system (CNS) are depicted in figure 4. The highest readmission rate was for patients aged 65 years and older (18.4 percent), followed by patients aged 45–64 years (15.7 percent). Readmission rates were lowest and similar for the two youngest age groups (13.0–13.4 percent). Readmission rates were highest for patients covered by Medicare (18.8 percent), followed by Medicaid (16.7 percent) and private insurance (13.3 percent).



**Figure 4. All-cause 30-day readmission rates for incision and excision of central nervous system (CNS) by age and insurance status, U.S. hospitals, 2010**

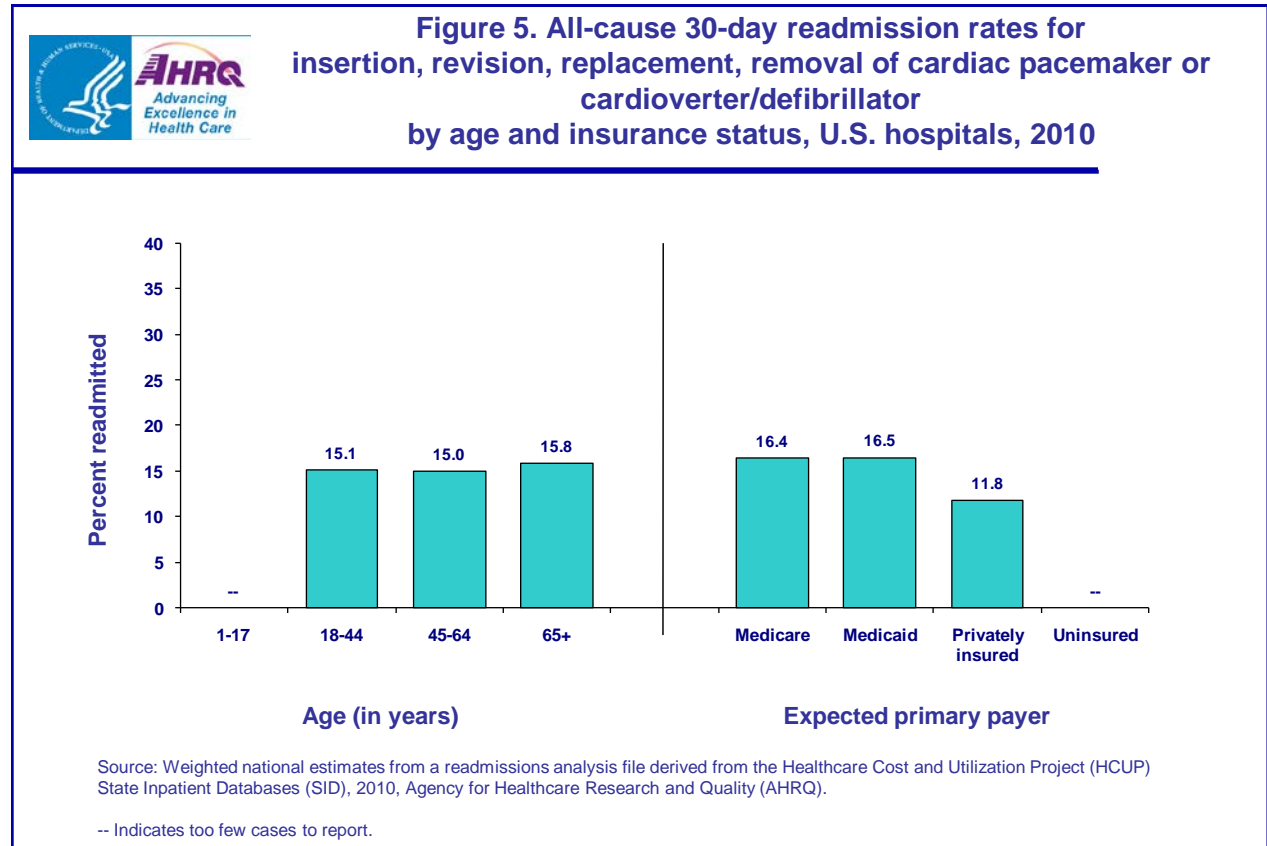


Source: Weighted national estimates from a readmissions analysis file derived from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), 2010, Agency for Healthcare Research and Quality (AHRQ).

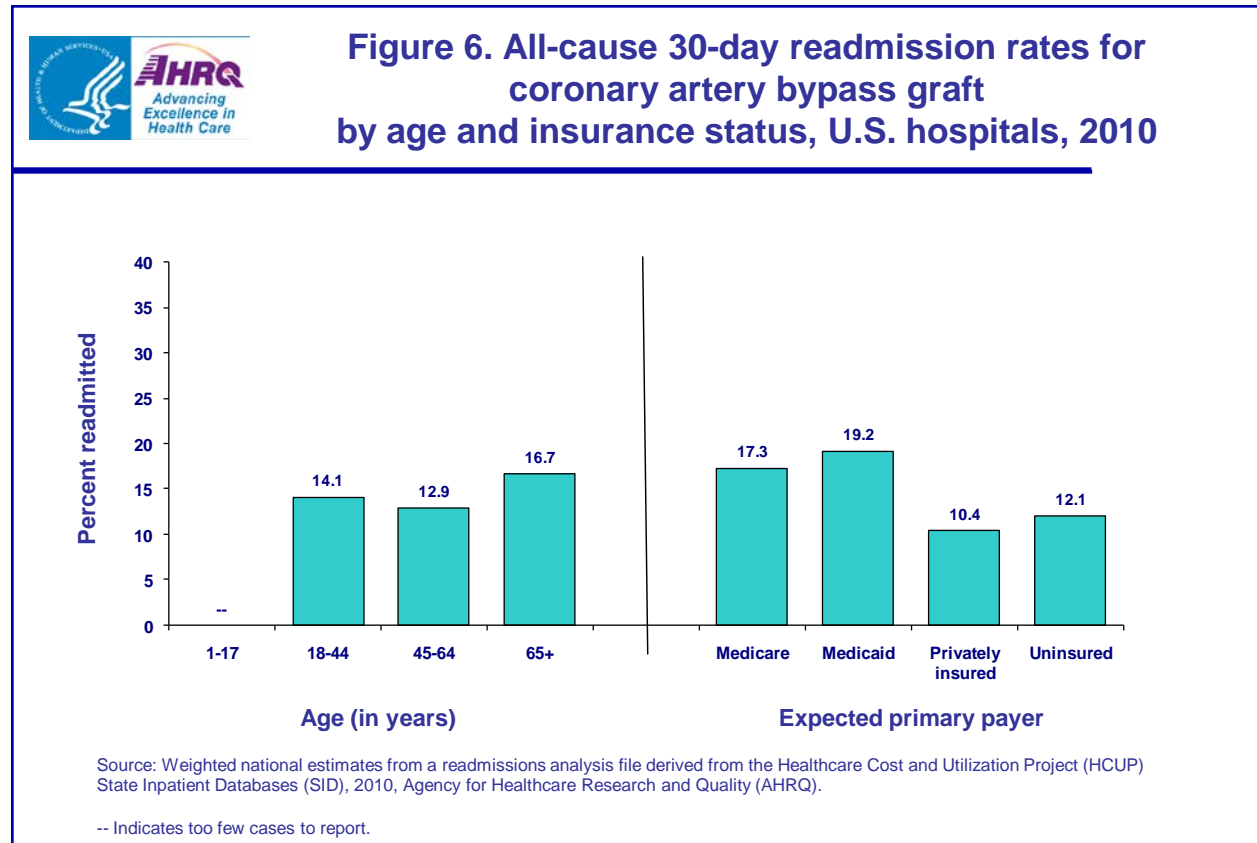
-- Indicates too few cases to report.



Figure 5 presents readmission rates for procedures related to a cardiac pacemaker or cardioverter/defibrillator. Readmission rates generally were similar for all adult age groups. Readmission rates were highest and similar for Medicare-covered (16.4 percent) and Medicaid-covered (16.5 percent) patients and lowest for privately insured patients (11.8 percent).



Finally, readmission rates for coronary artery bypass graft (CABG) are shown in figure 6. Readmission rates were highest for patients aged 65 years and older (16.7 percent), followed by those in age groups 18–44 (14.1 percent) and 45–64 (12.9 percent). The readmission rate was highest for patients with a primary expected payer of Medicaid (19.2 percent) or Medicare (17.3 percent) and lowest for the uninsured (12.1 percent) and those with private insurance (10.4 percent).



Overall, across select procedures with high volume (more than 100,000 index stays) and high readmission rates (at least 15 percent), the 30-day readmission rate consistently was higher for patients aged 65 years and older than for younger adults. In terms of payer, patients with Medicare and Medicaid coverage also consistently had higher readmission rates than patients with private insurance or those who were uninsured.

**Appendix. All-cause 30-day readmissions for selected procedures,\* U.S. hospitals, 2010**

All-listed procedure for index hospital stay (Clinical Classification Software procedure numbers and label/description)		Number of index stays	30-day all-cause readmissions	
			Number of readmissions	Percent readmitted
<b>Operations on the Nervous System</b>				
1	Incision and excision of the central nervous system (CNS), (brain and spinal cord)	105,700	17,019	16.1
2	Insertion, replacement, or removal of extracranial ventricular shunt (passage to release spinal fluid)	32,957	6,633	20.1
3	Laminectomy, excision intervertebral disc (back surgery)	456,664	30,383	6.7
5	Insertion of catheter or spinal stimulator and injection into spinal canal	6,302	637	10.1
6	Decompression (removing pressure from) peripheral nerve	15,834	1,436	9.1
<b>Operations on the Endocrine System</b>				
10	Thyroidectomy, partial or complete (removal of all or part of thyroid gland)	52,274	2,982	5.7
<b>Operations on the Ear, Nose, Mouth, and Pharynx</b>				
23	Myringotomy (tiny incision in the eardrum)	8,777	764	8.7
28	Plastic procedures on nose	9,759	635	6.5
30	Tonsillectomy and/or adenoidectomy (surgical removal of tonsil and/or adenoid)	25,480	1,216	4.8
<b>Operations on the Respiratory System</b>				
34	Tracheostomy, temporary and permanent (surgical placement of a hole in the trachea—passage to lung—to assist breathing)	9,335	2,234	23.9
36	Lobectomy or pneumonectomy (surgical operation to remove an entire lung or part of a lung)	82,264	9,431	11.5
37	Diagnostic bronchoscopy and biopsy of bronchus (procedure to view and biopsy the breathing passages in the lung through a lighted tube)	32,530	7,623	23.4
39	Incision of pleura, thoracentesis, chest drainage (incision of lining of lungs, removal of fluid through a needle)	13,933	2,648	19.0
<b>Operations on the Cardiovascular System</b>				
43	Heart valve procedures	110,615	20,502	18.5
44	Coronary artery bypass graft (CABG), (procedure to restore blood supply to the heart muscle)	234,840	35,484	15.1
45	Percutaneous coronary angioplasty (PTCA), (procedure involving use of a balloon-tipped catheter to enlarge a narrowed artery)	603,446	78,038	12.9
48	Insertion, revision, replacement, removal of cardiac pacemaker or cardioverter/defibrillator	149,147	23,057	15.5
51	Endarterectomy, vessel of head and neck (surgical removal of an obstructing clot from the arteries of the neck and head)	96,711	9,233	9.5
52	Aortic resection, replacement or anastomosis (surgery on the great artery that carries blood to the body)	46,861	6,116	13.1
55	Peripheral vascular bypass (bypass of arteries in arms or legs to restore blood supply)	72,529	15,005	20.7
57	Procedures to create access for hemodialysis	49,982	13,682	27.4
60	Embolectomy and endarterectomy of lower limbs (surgical removal of an obstructing clot from the arteries of the legs)	44,584	9,387	21.1
<b>Operations on the Hemic and Lymphatic System</b>				
64	Bone marrow transplant	12,919	2,905	22.5
66	Procedures on spleen	23,600	4,162	17.6

**Appendix. All-cause 30-day readmissions for selected procedures,\* U.S. hospitals, 2010**

All-listed procedure for index hospital stay (Clinical Classification Software procedure numbers and label/description)		Number of index stays	30-day all-cause readmissions	
			Number of readmissions	Percent readmitted
<b>Operations on the Digestive System</b>				
72	Colostomy, temporary and permanent (surgical construction of an artificial anus between the colon and the surface of the abdomen that empties into a bag outside the body)	46,675	8,859	19.0
73	Ileostomy and other enterostomy (except colostomy), (surgical procedure where small intestine is attached to the abdominal wall and empties into a bag outside the body)	23,392	6,811	29.1
74	Gastrectomy, partial and total (removal of all or part of the stomach)	34,551	4,728	13.7
75	Small bowel resection	83,157	15,050	18.1
78	Colorectal resection	294,071	43,388	14.8
80	Appendectomy (removal of appendix)	315,034	18,835	6.0
81	Hemorrhoid procedures	9,298	1,020	11.0
83	Biopsy of liver	13,649	2,554	18.7
84	Cholecystectomy (removal of gall bladder) and common duct exploration	419,433	39,774	9.5
85	Inguinal and femoral hernia repair	38,067	3,632	9.5
87	Laparoscopy (procedure in which a tiny scope is inserted into the abdomen through a small incision)	59,918	6,570	11.0
89	Exploratory laparotomy (abdominal surgery performed for diagnostic purposes)	24,819	4,080	16.4
90	Excision, lysis peritoneal adhesions	342,425	42,126	12.3
<b>Operations on the Urinary System</b>				
100	Endoscopy and endoscopic biopsy of the urinary tract (procedure to view and biopsy the urinary tract through a lighted tube)	8,927	1,764	19.8
101	Transurethral excision, drainage, or removal urinary obstruction	88,139	11,795	13.4
103	Nephrotomy and nephrostomy (procedure to establish an opening from the kidney to the exterior of the body)	43,773	10,508	24.0
104	Nephrectomy, partial or complete (surgical removal of kidney)	61,905	5,881	9.5
105	Kidney transplant	16,761	4,882	29.1
106	Genitourinary incontinence procedures	78,767	2,327	3.0
109	Procedures on the urethra (passage that carries urine from the bladder)	11,062	1,083	9.8
<b>Operations on the Male Genital Organs</b>				
113	Transurethral prostatectomy (TURP), (surgical removal of prostate gland through the urethra)	59,777	5,509	9.2
114	Open prostatectomy (surgery involving removal of part or all of the prostate gland)	75,419	3,429	4.6
<b>Operations on the Female Genital Organs</b>				
119	Oophorectomy, unilateral and bilateral (removal of an ovary or ovaries)	288,228	17,480	6.1
121	Ligation of fallopian tubes (for sterilization)	238,190	4,819	2.0

**Appendix. All-cause 30-day readmissions for selected procedures,\* U.S. hospitals, 2010**

All-listed procedure for index hospital stay (Clinical Classification Software procedure numbers and label/description)		Number of index stays	30-day all-cause readmissions	
			Number of readmissions	Percent readmitted
<b>Obstetrical Procedures</b>				
124	Hysterectomy, abdominal and vaginal (removal of the uterus)	409,674	19,446	4.7
127	Dilatation and curettage (D&C), aspiration after delivery or abortion	26,335	736	2.8
128	Diagnostic dilatation and curettage (D&C)	14,851	1,537	10.4
129	Repair of cystocele (bladder hernia) and rectocele (rectal hernia), obliteration of vaginal vault	95,703	2,487	2.6
134	Cesarean section (C-section)	1,209,422	24,281	2.0
<b>Operations on the Musculoskeletal System</b>				
142	Partial excision bone	307,221	30,810	10.0
144	Treatment, facial fracture or dislocation	24,077	1,446	6.0
145	Treatment, fracture or dislocation of radius and ulna (lower arm)	57,263	3,616	6.3
146	Treatment, fracture or dislocation of hip and femur	278,118	33,049	11.9
147	Treatment, fracture or dislocation of lower extremity (other than hip or femur)	194,033	15,816	8.2
149	Arthroscopy (procedure to view the inside of a joint through a lighted tube and to diagnose and treat problems)	13,881	962	6.9
150	Division of joint capsule, ligament or cartilage	13,371	833	6.2
151	Excision of semilunar cartilage of knee	7,291	698	9.6
152	Arthroplasty knee (surgical reconstruction or replacement of knee)	651,965	32,764	5.0
153	Hip replacement, total and partial	424,408	34,265	8.1
154	Arthroplasty other than hip or knee (surgical reconstruction or replacement of other joints)	76,498	3,926	5.1
157	Amputation of lower extremity (leg, foot, or toe)	124,880	28,488	22.8
158	Spinal fusion (correction of an unstable part of the spine by joining two or more vertebrae)	431,577	29,326	6.8
<b>Operations on the Integumentary System and Breast</b>				
166	Lumpectomy, quadrantectomy of breast (operation to remove a lump from the breast)	12,872	1,095	8.5
167	Mastectomy (operation to remove the whole breast)	61,885	3,868	6.3
169	Debridement of wound, infection or burn (surgical removal of foreign material and dead tissue from a wound, infection or burn)	148,544	28,394	19.1
170	Excision of skin lesion	7,404	1,007	13.6
172	Skin graft (procedure during which a piece of skin is taken from a donor area and surgically grafted at the site of an injury or burn)	97,756	14,789	15.1
<b>Miscellaneous Diagnostic and Therapeutic Procedures</b>				
184	Intraoperative cholangiogram (X-ray procedure where a contrast dye is injected into the bile duct during surgery)	134,934	11,551	8.6
211	Therapeutic radiology	5,183	1,212	23.4

Source: Weighted national estimates from a readmissions analysis file derived from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), 2010, Agency for Healthcare Research and Quality (AHRQ).

\* Information is provided for procedures with at least 5,000 weighted occurrences and 500 or more weighted readmissions. See text and Definitions for details on methods for calculating readmissions.

## Data Source

The estimates in this Statistical Brief are based on a readmissions analysis file that was created with the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID). These databases include reliable, verified synthetic patient identifiers that can be used to track a person across hospitals within a State. Estimates were taken from HCUPnet, the online query system that provides free access to information from HCUP: <http://hcupnet.ahrq.gov/>. HCUPnet provides access to health statistics and information on hospital inpatient and emergency department utilization, and it includes analytic tables using the readmissions analysis file. HCUPnet contains additional detailed results and sortable tables that provide instant information on readmissions to the hospital within 30 days of discharge.

For 2010, readmissions data were available from 18 States: Alaska, Arkansas, California, Florida, Georgia, Hawaii, Louisiana, Massachusetts, Mississippi, Missouri, Nebraska, New Mexico, New York, South Carolina, Tennessee, Utah, Virginia, and Washington. These 18 States are geographically dispersed and account for 46 percent of the total U.S. resident population and 45 percent of the total U.S. hospitalizations. The readmissions analysis file included 14.0 million unweighted discharges.

The study population in this readmissions analysis file included discharges from community, nonrehabilitation, nonspecialty hospitals. Weights for national estimates were developed using poststratification on hospital characteristics (Census region, urban-rural location, teaching capabilities, bed size, and control/ownership) and patient age groups.

## Definitions

### *Procedures, ICD-9-CM, and Clinical Classifications Software (CCS)*

*All-listed procedures* include all procedures performed during the hospital stay whether for definitive treatment or for diagnostic or exploratory purposes.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to procedures. There are approximately 4,000 ICD-9-CM procedure codes.

CCS categorizes procedure codes into clinically meaningful categories.<sup>9</sup> This "clinical grouper" makes it easier to quickly understand patterns of procedure use. CCS categories identified as "Other" typically are not reported; these categories include miscellaneous, otherwise unclassifiable procedures that may be difficult to interpret as a group.

### *Readmissions*

The 30-day readmission rate is defined as the number of admissions for each procedure for which there was at least one subsequent hospital admission within 30 days, divided by the total number of admissions from January through November 2010. 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 a readmission. No more than one readmission is counted within the 30-day period, because the outcome measure assessed is "percentage of admissions who 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 index (starting point) admission. Thus, a single patient can be counted multiple times during the course of the January through November observation period. In addition, index 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 index admission for a subsequent readmission. Admissions were disqualified from the analysis as index admissions if they could not be

---

<sup>9</sup> HCUP Clinical Classifications Software (CCS). Healthcare Cost and Utilization Project (HCUP). U.S. Agency for Healthcare Research and Quality, Rockville, MD. Updated March 2013. <http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp>. Accessed April 3, 2013.

followed for 30 days for one of the following reasons: (1) admissions in which the patient died in the hospital, (2) admissions missing information on length of stay, and (3) admissions discharged in December 2010.

#### *Types of hospitals included in HCUP*

HCUP 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). HCUP data include obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded are long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals.

#### *Payer (Insurance Status)*

Payer is the expected primary payer for the hospital stay. To make coding uniform across all HCUP data sources, payer combines detailed categories into more 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. Patients covered by the State Children's Health Insurance Program (SCHIP) may be included here. Because most State data do not identify SCHIP patients specifically, it is not possible to present this information separately.
- Private Insurance: includes Blue Cross, commercial carriers, and private health maintenance organizations (HMOs) and preferred provider organizations (PPOs)
- Other: includes Worker's Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs
- Uninsured: includes expected primary payer of "self-pay" and "no charge."

When more than one payer is listed for a hospital discharge, the first-listed payer is used.

#### **About HCUP**

HCUP is a family of powerful health care databases, software tools, and products for advancing research. Sponsored by the Agency for Healthcare Research and Quality (AHRQ), HCUP includes the largest all-payer encounter-level collection of longitudinal health care data (inpatient, ambulatory surgery, and emergency department) in the United States, beginning in 1988. HCUP is a Federal-State-Industry Partnership that brings together the data collection efforts of many organizations—such as State data organizations, hospital associations, private data organizations, and the Federal government—to create a national information resource.

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

**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

**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** Health Policy and Research  
**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 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 in 2010. 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 publicly available. HCUPnet has an easy step-by-step query system, allowing for tables and graphs to be generated on national and regional statistics as well as trends for community hospitals in the United States. HCUPnet generates statistics using data from HCUP's Nationwide Inpatient Sample (NIS), the Kids' Inpatient Database (KID), the Nationwide Emergency Department Sample (NEDS), 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/>. HCUPnet provides ready-to-use tables on readmission rates by condition



and procedure (using Clinical Classification Software categories), diagnosis related groups (DRGs), and major diagnostic categories (MDCs).

### **Suggested Citation**

Weiss AJ (Truven Health Analytics), Elixhauser A (AHRQ), Steiner C (AHRQ). Readmissions to U.S. Hospitals by Procedure, 2010. HCUP Statistical Brief #154. April 2013. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb154.pdf>.

### **Acknowledgments**

The authors would like to acknowledge the contributions of Marguerite Barrett and Minya Sheng for work on programming.

\* \* \*

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](mailto:hcup@ahrq.gov) or send a letter to the address below:

Irene Fraser, Ph.D., Director  
Center for Delivery, Organization, and Markets  
Agency for Healthcare Research and Quality  
540 Gaither Road  
Rockville, MD 20850