



**ANNUAL INCIDENCE OF
COMMON MUSCULOSKELETAL
PROCEDURES AND TREATMENT**

**Department of Research
& Scientific Affairs**

March 2014

Contents

I. Knee Procedures	3
Total Knee Replacement: 2000-2011	3
Knee Replacement Rate per 1,000 Medicare enrollees: 2000-2010	4
II. Hip Procedures	6
Total Hip Replacement: 2000-2011	6
Partial Hip Replacement: 2000-2011	6
Hip Replacement Rate per 1,000 Medicare enrollees: 2000-2010	7
Treatment of Fracture or Dislocation of Hip and Femur: 2000-2011	9
Hospitalizations for Hip Fracture Rate per 1,000 Medicare enrollees: 2000-2010	10
III. Shoulder Procedures	12
Total Shoulder Replacement: 2000-2011	12
Partial Shoulder Replacement: 2000-2011	12
IV. Back Procedures	13
Spinal Fusion: 2000-2011	13
Back Surgery Rate per 1,000 Medicare enrollees: 2000-2010	14

Suggested citation: Department of Research & Scientific Affairs, American Academy of Orthopaedic Surgeons. Annual Incidence of Common Musculoskeletal Procedures and Treatment.

www.aaos.org/research/stats/CommonProceduresTreatments-March2014.pdf. Published March 2014.

Accessed [date].

I. KNEE PROCEDURES

These national estimates are based on all-listed procedures, which include all procedures performed during the hospital stay. The unit of analysis is discharge: if a particular procedure occurs multiple times during the same hospital stay, it is only counted once. A person who is admitted to the hospital multiple times in one year is counted each time as a separate “discharge.”

TOTAL KNEE REPLACEMENT: 2000-2011

Total Knee Replacement is defined as ICD-9-CM procedure code 81.54. Total Knee Replacement includes bicompartamental, partial knee replacement, tricompartmental, and unicompartmental (hemijoint). These estimates do not include revision or resurfacing procedures.

Year	Discharges	Male	Female	1-17 years	18-44 years	45-64 years	65-84 years	85+ years
2000	282,350	37%	63%	*	2%	31%	63%	3%
2001	314,402	36%	64%	*	2%	32%	62%	3%
2002	351,018	36%	64%	*	2%	35%	60%	3%
2003	380,775	35%	65%	*	2%	36%	59%	3%
2004	432,379	35%	65%	*	2%	36%	58%	3%
2005	498,169	36%	64%	*	2%	38%	57%	3%
2006	497,001	36%	64%	*	2%	39%	56%	3%
2007	551,259	36%	64%	*	2%	40%	55%	3%
2008	616,617	37%	63%	*	2%	41%	54%	3%
2009	621,029	37%	63%	*	2%	41%	54%	3%
2010	658,340	37%	63%	*	2%	42%	53%	3%
2011	645,062	38%	62%	*	2%	43%	53%	3%

*No reliable estimate. Age/sex segments may not add up to 100% because of missing data and rounding.

DATA SOURCE: HCUP Nationwide Inpatient Sample, 2000-2011; Agency for Healthcare Research and Quality.

KNEE REPLACEMENT RATE PER 1,000 MEDICARE ENROLLEES: 2000-2010

State	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Alabama	5.31	5.90	6.62	7.00	7.92	8.25	8.28	8.29	8.33	8.72	9.16
Alaska	5.63	6.04	6.48	6.75	6.98	9.01	9.38	9.10	8.71	8.58	9.10
Arizona	5.82	6.10	6.30	6.78	8.08	8.19	8.80	9.16	8.91	9.42	9.64
Arkansas	5.12	5.78	6.15	6.63	7.56	8.98	9.19	9.31	9.06	8.92	9.37
California	4.41	4.70	5.21	5.67	6.41	6.96	7.20	7.20	6.97	7.05	7.20
Colorado	5.89	6.73	7.52	8.18	8.85	10.29	10.44	10.47	10.16	10.93	11.28
Connecticut	4.15	4.55	5.26	5.49	6.30	6.57	6.96	7.29	7.60	7.76	7.77
Delaware	5.30	6.62	6.90	7.72	8.41	9.36	9.80	10.07	9.87	9.60	9.92
D.C.	4.61	4.86	4.83	5.64	6.64	7.76	7.32	6.83	6.29	7.60	7.66
Florida	5.46	5.87	6.34	6.71	7.36	7.91	8.29	8.28	8.42	8.49	8.75
Georgia	5.23	5.53	5.73	6.29	7.22	7.50	8.26	8.31	8.17	8.57	8.86
Hawaii	1.93	2.07	2.13	2.68	2.52	3.47	3.10	2.91	3.58	3.35	3.42
Idaho	7.89	8.32	8.36	9.92	10.51	10.78	11.22	11.19	11.18	11.95	12.58
Illinois	5.71	6.54	6.81	7.51	8.47	9.01	9.07	9.21	9.07	9.23	9.79
Indiana	5.83	6.56	6.67	7.65	8.28	9.14	9.08	9.26	9.30	9.92	10.22
Iowa	8.71	8.54	9.27	9.99	11.39	11.39	11.68	11.34	11.92	12.16	12.25
Kansas	8.09	8.85	8.87	9.18	10.32	11.32	11.75	11.79	12.04	12.26	12.23
Kentucky	4.50	4.86	5.16	5.72	6.54	7.41	7.53	8.06	8.30	8.62	9.05
Louisiana	5.06	5.56	6.23	6.41	7.36	8.20	8.52	8.30	8.40	8.41	8.58
Maine	5.38	5.89	6.10	6.47	7.13	7.64	7.72	8.19	8.18	8.42	8.58
Maryland	5.57	6.38	6.54	7.44	8.69	8.64	8.92	9.35	9.18	8.97	8.98
Massachusetts	4.21	4.45	4.88	5.64	6.37	6.76	7.02	7.17	7.24	7.29	7.68
Michigan	6.37	6.96	7.72	8.54	9.64	10.52	10.31	10.14	10.24	10.19	10.82
Minnesota	7.13	7.48	7.77	8.99	10.37	11.20	11.24	11.57	11.38	11.62	12.02
Mississippi	4.70	5.59	5.89	6.33	7.20	7.76	8.16	8.19	8.40	8.17	8.58
Missouri	6.27	6.86	7.36	7.76	8.80	9.37	9.31	9.59	9.30	9.64	9.95
Montana	6.47	7.37	7.78	8.33	9.80	10.95	10.57	10.35	11.12	10.73	11.42
Nebraska	8.23	9.18	9.67	10.75	12.51	12.80	12.64	12.76	11.98	12.90	13.09
Nevada	4.09	4.58	4.95	5.33	6.19	6.82	7.04	6.55	6.68	6.83	7.43

KNEE REPLACEMENT RATE (PER 1,000 MEDICARE ENROLLEES) – CONTINUED

State	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
New Hampshire	5.19	5.62	6.43	6.54	7.26	7.04	7.27	7.27	7.41	7.98	7.87
New Jersey	3.47	4.00	4.33	4.57	5.25	5.79	5.99	6.21	6.47	6.48	6.67
New Mexico	5.23	5.51	5.82	6.24	6.54	6.89	7.01	7.27	7.23	7.13	7.98
New York	3.64	4.31	4.44	4.80	5.41	5.81	5.87	6.01	6.00	5.91	6.29
North Carolina	5.38	5.86	6.10	6.59	7.63	8.33	8.32	8.93	8.85	9.08	9.31
North Dakota	7.53	8.22	8.56	9.93	10.93	11.20	11.34	10.86	11.97	10.68	11.82
Ohio	5.69	6.32	6.99	7.55	8.36	9.28	9.26	9.59	9.93	10.11	9.85
Oklahoma	6.06	6.55	7.12	8.29	9.06	9.67	9.35	8.97	9.63	10.31	11.16
Oregon	5.45	5.84	6.18	6.86	7.43	8.20	8.02	8.19	9.22	8.28	8.72
Pennsylvania	5.40	6.03	6.26	6.66	7.74	8.63	8.57	9.13	8.80	8.87	8.84
Rhode Island	3.70	4.36	4.97	4.98	5.22	5.57	5.93	6.46	7.15	7.17	7.10
South Carolina	5.58	6.44	6.81	7.36	8.02	8.63	8.93	9.04	9.19	9.28	9.75
South Dakota	8.03	8.35	9.53	10.12	10.80	12.70	12.67	12.85	11.99	12.14	12.56
Tennessee	4.43	5.01	5.32	5.93	6.63	7.37	7.46	7.61	7.71	7.96	8.51
Texas	5.77	6.17	6.65	7.13	8.12	8.78	8.88	8.87	9.01	9.24	9.43
Utah	7.56	8.25	8.94	10.44	11.85	12.32	12.67	12.49	12.37	13.10	12.44
Vermont	4.70	5.11	6.42	6.64	7.25	7.46	7.12	7.76	7.13	7.73	7.27
Virginia	4.77	5.21	5.76	6.11	7.21	7.65	8.07	8.20	8.47	8.73	8.88
Washington	5.35	5.72	6.56	7.21	7.51	8.13	8.67	8.32	8.53	8.66	9.13
West Virginia	4.64	5.11	5.56	5.91	6.80	7.77	7.73	7.66	7.52	7.87	7.71
Wisconsin	7.09	7.65	7.89	9.25	10.11	10.79	10.57	10.61	10.37	10.83	11.02
Wyoming	6.55	7.39	7.31	8.84	9.77	11.09	11.56	10.02	9.87	10.43	10.71
United States	5.38	5.90	6.31	6.88	7.74	8.36	8.49	8.59	8.61	8.77	9.04

DATA SOURCE: Based on MEDPAR data analyzed and presented by the Dartmouth Atlas of Health Care, 2000-2010; The Dartmouth Institute for Health Policy and Clinical Practice.

II. HIP PROCEDURES

These national estimates are based on all-listed procedures, which include all procedures performed during the hospital stay. The unit of analysis is discharge: if a particular procedure occurs multiple times during the same hospital stay, it is only counted once. A person who is admitted to the hospital multiple times in one year is counted each time as a separate “discharge.”

TOTAL HIP REPLACEMENT: 2000-2011

Total Hip Replacement is defined as ICD-9-CM procedure code 81.51. These estimates do not include revision procedures.

Year	Discharges	Male	Female	1-17 years	18-44 years	45-64 years	65-84 years	85+ years
2000	165,065	42%	58%	*	7%	31%	55%	6%
2001	185,200	41%	59%	*	6%	31%	57%	6%
2002	201,831	42%	58%	*	7%	34%	54%	5%
2003	202,325	42%	58%	*	7%	34%	54%	5%
2004	226,581	42%	58%	*	7%	36%	52%	5%
2005	238,130	43%	56%	*	6%	38%	51%	5%
2006	229,001	43%	56%	*	6%	39%	49%	5%
2007	252,680	42%	56%	*	6%	39%	50%	5%
2008	277,399	44%	56%	*	6%	40%	49%	5%
2009	285,471	44%	56%	*	5%	40%	49%	5%
2010	302,839	44%	56%	*	5%	42%	48%	5%
2011	306,600	44%	56%	*	5%	42%	48%	5%

*No reliable estimate. Age/sex segments may not add up to 100% because of missing data and rounding.
DATA SOURCE: HCUP Nationwide Inpatient Sample, 2000-2011; Agency for Healthcare Research and Quality.

PARTIAL HIP REPLACEMENT: 2000-2011

Partial Hip Replacement is defined as ICD-9-CM procedure code 81.52. These estimates do not include revision procedures.

Year	Discharges	Male	Female	1-17 years	18-44 years	45-64 years	65-84 years	85+ years
2000	107,641	25%	75%	*	1%	6%	56%	37%
2001	107,676	25%	75%	*	1%	7%	55%	38%
2002	106,800	26%	74%	*	1%	7%	56%	36%
2003	105,504	26%	74%	*	1%	7%	55%	37%
2004	103,676	27%	73%	*	1%	8%	55%	36%
2005	107,560	27%	73%	*	1%	7%	54%	38%
2006	104,729	28%	72%	*	1%	8%	53%	38%
2007	103,748	28%	72%	*	1%	8%	53%	39%
2008	108,491	28%	72%	*	1%	8%	52%	39%
2009	103,392	28%	71%	*	1%	8%	51%	41%
2010	101,737	29%	71%	*	1%	8%	50%	41%
2011	105,509	29%	71%	*	1%	8%	50%	42%

*No reliable estimate. Age/sex segments may not add up to 100% because of missing data and rounding.
DATA SOURCE: HCUP Nationwide Inpatient Sample, 2000-2011; Agency for Healthcare Research and Quality.

HIP REPLACEMENT RATE PER 1,000 MEDICARE ENROLLEES: 2000-2010

State	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Alabama	2.17	2.21	2.27	2.46	2.57	2.60	2.54	2.68	2.88	3.12	3.05
Alaska	2.99	3.31	3.65	3.26	4.18	3.46	3.67	3.74	3.96	4.55	4.38
Arizona	2.94	3.19	3.13	3.33	3.55	3.49	3.65	3.64	3.82	4.32	4.42
Arkansas	2.10	2.45	2.44	2.61	2.85	2.68	2.63	2.71	2.90	3.10	3.15
California	2.58	2.81	2.83	2.91	3.12	3.13	3.12	3.09	3.24	3.32	3.39
Colorado	3.53	3.70	4.08	4.17	4.35	4.43	4.41	4.65	4.54	4.93	5.07
Connecticut	2.80	3.10	3.31	3.34	3.62	3.67	3.65	3.78	4.05	4.22	4.33
Delaware	3.15	3.08	3.07	2.98	3.62	3.66	3.70	3.50	3.59	4.21	4.29
D.C.	2.65	3.11	3.42	3.90	3.88	3.58	3.48	4.20	3.83	3.83	3.75
Florida	2.83	3.06	3.13	3.27	3.47	3.44	3.54	3.53	3.73	3.96	4.11
Georgia	2.21	2.42	2.51	2.66	2.63	2.67	2.76	2.90	3.10	3.28	3.59
Hawaii	0.63	0.82	0.91	0.93	1.08	0.95	1.08	1.04	1.25	1.37	1.45
Idaho	4.13	4.67	4.33	4.58	5.00	4.86	4.93	4.52	4.67	5.05	5.81
Illinois	2.98	3.37	3.41	3.56	3.79	3.82	3.71	3.57	4.02	4.19	4.35
Indiana	2.89	3.04	3.27	3.57	3.53	3.50	3.43	3.49	3.79	3.91	4.36
Iowa	4.08	4.20	4.36	4.61	4.52	4.55	4.59	4.57	4.90	5.12	4.89
Kansas	3.37	3.63	3.50	3.58	3.80	3.81	3.77	3.65	4.03	4.14	4.11
Kentucky	2.20	2.35	2.46	2.48	2.75	2.80	2.73	2.75	3.15	3.39	3.63
Louisiana	1.76	1.91	1.98	2.06	2.17	2.12	2.17	2.39	2.38	2.61	2.69
Maine	3.24	3.24	3.46	3.52	3.37	3.75	3.66	3.92	3.75	4.37	4.46
Maryland	2.67	2.82	3.12	3.18	3.57	3.44	3.24	3.25	3.78	3.81	4.05
Massachusetts	2.45	2.72	2.94	3.16	3.38	3.22	3.35	3.35	3.63	3.71	3.84
Michigan	3.22	3.58	3.75	3.95	4.20	4.28	3.96	4.05	4.15	4.35	4.66
Minnesota	3.99	4.20	4.26	4.64	4.90	5.00	4.98	5.34	5.63	5.75	5.75
Mississippi	1.99	2.29	2.22	2.35	2.33	2.42	2.45	2.49	2.55	2.67	2.96
Missouri	2.61	2.82	2.81	3.11	3.13	3.22	3.15	3.31	3.54	3.57	3.68
Montana	3.79	4.24	4.56	4.27	5.06	4.99	4.94	4.90	5.34	5.18	5.81
Nebraska	3.74	3.92	4.21	4.26	4.42	4.33	4.25	4.09	4.56	4.91	4.86
Nevada	2.64	2.83	3.01	3.16	3.48	3.17	3.53	3.35	3.27	3.86	4.04

HIP REPLACEMENT RATE (PER 1,000 MEDICARE ENROLLEES) – CONTINUED

State	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
New Hampshire	2.97	3.15	3.17	3.21	3.47	3.37	3.30	3.80	3.99	4.13	4.13
New Jersey	2.30	2.49	2.60	2.72	3.03	3.09	2.97	3.00	3.38	3.44	3.58
New Mexico	2.10	2.35	2.34	2.71	2.57	2.71	2.70	2.77	2.92	3.41	3.55
New York	2.57	2.85	2.97	3.08	3.25	3.16	3.11	3.20	3.39	3.55	3.63
North Carolina	2.52	2.74	2.76	2.87	3.20	3.12	3.07	3.28	3.55	3.75	3.75
North Dakota	4.01	4.25	4.62	4.17	4.92	5.02	5.22	5.04	5.47	5.23	5.71
Ohio	2.90	3.18	3.26	3.44	3.59	3.52	3.55	3.74	4.05	4.23	4.15
Oklahoma	2.19	2.39	2.53	2.65	2.86	2.80	2.71	2.67	3.19	3.21	3.45
Oregon	3.18	3.64	3.41	3.85	4.23	4.06	3.79	3.98	4.13	4.23	4.39
Pennsylvania	2.60	2.84	2.86	2.89	3.25	3.26	3.27	3.31	3.51	3.85	3.81
Rhode Island	2.42	2.62	2.75	3.03	3.15	2.80	2.77	3.25	3.74	3.88	3.86
South Carolina	2.31	2.56	2.79	2.81	3.03	3.10	3.05	3.10	3.32	3.48	3.86
South Dakota	3.76	4.36	4.36	4.40	4.49	4.86	4.81	4.58	4.45	5.40	5.20
Tennessee	2.28	2.44	2.59	2.64	2.78	2.79	2.80	2.83	3.06	3.22	3.33
Texas	1.94	2.08	2.21	2.28	2.45	2.47	2.40	2.44	2.80	2.88	2.95
Utah	3.86	3.77	4.46	4.52	4.88	4.85	4.48	4.74	4.73	5.22	5.28
Vermont	4.00	3.63	3.78	4.08	4.68	4.27	4.18	4.42	4.42	4.61	4.17
Virginia	2.66	2.88	2.70	2.93	3.17	3.30	3.23	3.37	3.54	3.87	3.86
Washington	3.47	3.86	3.90	4.06	4.16	4.08	4.07	4.31	4.56	4.66	4.60
West Virginia	2.15	2.42	2.44	2.60	2.73	2.44	2.60	2.42	2.81	2.78	2.84
Wisconsin	3.43	3.91	4.13	4.34	4.41	4.48	4.44	4.60	4.88	5.10	4.91
Wyoming	3.42	4.10	4.01	4.45	4.60	4.54	4.81	4.55	4.31	4.96	4.92
United States	2.72	2.95	3.04	3.18	3.37	3.36	3.33	3.38	3.62	3.80	3.91

DATA SOURCE: Based on MEDPAR data analyzed and presented by the Dartmouth Atlas of Health Care, 2000-2010; The Dartmouth Institute for Health Policy and Clinical Practice.

TREATMENT OF FRACTURE OR DISLOCATION OF HIP AND FEMUR: 2000-2011

Treatment of Fracture or Dislocation of Hip and Femur is defined as AHRQ’s CCS all-listed procedure category 146 – Treatment, fracture or dislocation of hip and femur.

Year	Discharges	Male	Female	1-17 years	18-44 years	45-64 years	65-84 years	85+ years
2000	296,349	34%	66%	6%	10%	12%	43%	29%
2001	299,194	34%	66%	7%	9%	12%	43%	29%
2002	301,351	36%	64%	7%	10%	13%	42%	27%
2003	303,880	35%	64%	7%	10%	14%	42%	27%
2004	308,115	37%	63%	7%	11%	14%	41%	26%
2005	313,655	36%	64%	8%	9%	14%	41%	28%
2006	301,060	36%	64%	6%	10%	15%	40%	28%
2007	304,828	36%	64%	6%	10%	15%	41%	28%
2008	310,425	35%	65%	5%	9%	16%	41%	29%
2009	304,582	35%	65%	5%	9%	16%	41%	28%
2010	313,770	37%	63%	6%	10%	17%	39%	28%
2011	307,097	34%	65%	5%	8%	16%	41%	30%

*No reliable estimate. Age/sex segments may not add up to 100% because of missing data and rounding.
 DATA SOURCE: HCUP Nationwide Inpatient Sample, 2000-2011; Agency for Healthcare Research and Quality.

HOSPITALIZATIONS FOR HIP FRACTURE RATE PER 1,000 MEDICARE ENROLLEES: 2000-2010

State	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Alabama	9.49	8.84	9.01	8.67	9.04	8.85	8.87	8.79	8.57	8.72	8.50
Alaska	7.34	7.04	6.78	6.85	6.34	6.81	6.69	7.32	6.49	6.42	5.94
Arizona	7.98	7.98	7.81	7.72	7.37	7.35	7.19	7.19	7.15	6.93	6.90
Arkansas	8.95	9.26	8.59	8.25	8.65	8.13	8.60	8.49	8.20	8.28	8.04
California	7.15	7.19	6.87	6.74	6.59	6.43	6.47	6.35	6.10	5.88	5.73
Colorado	8.47	8.23	8.05	7.37	7.86	7.77	7.82	7.48	7.08	6.77	6.63
Connecticut	7.16	7.06	6.55	6.56	6.30	6.24	6.51	6.20	5.98	5.88	5.89
Delaware	8.11	7.33	6.48	7.06	6.79	6.77	6.86	6.49	6.95	5.86	6.05
D.C.	6.99	7.01	6.64	6.23	6.50	6.23	6.67	6.24	6.24	5.08	6.17
Florida	8.01	7.76	7.56	7.46	7.52	7.25	7.31	7.22	6.98	7.00	6.85
Georgia	9.37	8.69	8.63	8.78	8.70	8.55	8.40	8.48	8.33	8.32	7.98
Hawaii	3.18	3.70	3.01	2.79	3.28	3.36	2.89	2.96	2.98	2.76	2.52
Idaho	7.47	7.32	7.21	6.76	7.13	7.33	7.13	7.29	6.76	6.71	5.99
Illinois	7.71	7.82	7.61	7.40	7.20	7.18	7.03	7.15	6.97	6.69	6.42
Indiana	8.17	7.82	7.71	7.73	7.61	7.64	7.36	7.39	7.43	7.05	6.82
Iowa	7.87	7.63	7.38	7.43	7.48	7.19	7.16	7.17	7.25	6.90	6.28
Kansas	8.84	8.51	8.26	8.00	8.00	8.20	7.94	8.30	7.68	7.62	7.07
Kentucky	9.06	8.96	8.74	8.75	8.64	8.87	8.89	8.78	8.76	8.27	7.83
Louisiana	8.78	8.39	8.26	8.44	8.30	8.70	8.66	8.40	8.47	7.86	8.12
Maine	7.76	7.59	7.32	7.34	6.90	7.00	6.27	6.91	6.74	6.59	6.13
Maryland	7.47	7.28	7.17	6.93	6.85	6.77	6.71	6.91	6.34	6.24	6.07
Massachusetts	7.44	7.16	7.10	6.67	6.45	6.31	6.33	6.45	6.18	6.10	5.85
Michigan	7.36	7.17	7.09	6.97	6.70	6.73	6.36	6.69	6.39	6.21	5.92
Minnesota	7.50	7.56	7.14	6.68	6.76	6.72	6.34	6.37	6.33	6.15	5.78
Mississippi	8.82	8.81	8.38	8.19	8.20	8.46	8.40	8.42	8.30	8.54	8.03
Missouri	8.97	8.77	8.68	8.59	8.13	8.17	8.18	8.15	7.92	7.41	7.12
Montana	8.28	8.41	7.73	7.12	7.76	7.37	7.71	7.45	7.00	7.22	7.22
Nebraska	7.91	8.05	8.08	7.88	7.48	7.66	7.79	7.48	7.73	7.01	6.89
Nevada	8.67	7.79	7.98	7.68	7.64	7.49	7.29	7.58	6.95	7.25	7.08

HOSPITALIZATIONS FOR HIP FRACTURE RATE (PER 1,000 MEDICARE ENROLLEES) – CONTINUED

State	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
New Hampshire	7.38	7.29	7.50	7.28	6.59	6.21	6.26	6.47	6.37	5.69	5.77
New Jersey	7.31	7.22	7.11	6.85	6.59	6.63	6.52	6.44	6.34	6.22	5.79
New Mexico	9.34	9.13	8.29	8.09	8.43	8.11	8.17	7.96	8.35	7.55	7.45
New York	7.34	7.08	7.01	6.98	6.75	6.55	6.52	6.42	6.30	6.10	5.79
North Carolina	9.39	9.07	8.85	8.78	8.53	8.40	8.52	8.28	8.08	7.89	7.71
North Dakota	6.96	7.06	6.86	6.67	6.39	7.10	6.65	6.09	6.78	7.15	6.24
Ohio	8.18	7.97	7.60	7.44	7.64	7.34	7.35	7.19	7.26	7.04	6.80
Oklahoma	9.49	9.84	9.27	9.06	8.99	9.22	9.07	9.23	8.74	8.73	8.39
Oregon	7.62	7.70	7.50	7.12	7.55	7.14	7.10	6.93	6.91	6.43	6.00
Pennsylvania	7.71	7.56	7.41	7.35	7.10	6.91	6.76	6.70	6.56	6.37	6.22
Rhode Island	7.81	7.18	6.98	6.42	6.75	6.47	6.27	6.24	6.29	6.46	6.00
South Carolina	9.04	9.07	8.55	8.28	8.18	8.31	8.30	8.33	8.04	7.93	7.59
South Dakota	7.30	8.10	7.14	7.97	7.26	7.11	7.18	7.14	7.08	6.86	6.82
Tennessee	9.80	9.50	9.28	8.87	9.18	8.85	8.91	8.76	8.70	8.48	8.38
Texas	8.87	8.79	8.49	8.47	8.30	8.30	8.35	8.38	8.27	7.73	7.63
Utah	7.11	6.95	6.81	7.01	7.29	6.79	7.17	7.10	6.74	6.40	6.39
Vermont	6.72	7.66	7.33	7.22	6.17	7.47	6.99	6.95	6.34	5.94	6.14
Virginia	8.51	8.44	8.17	8.25	7.97	7.82	7.80	7.68	7.28	7.23	6.96
Washington	7.64	7.29	7.15	6.83	6.81	6.72	6.95	6.74	6.41	6.11	5.94
West Virginia	8.98	8.76	8.48	8.46	8.41	8.28	8.49	8.33	8.12	8.07	7.86
Wisconsin	7.32	7.20	6.83	6.71	6.63	6.64	6.72	6.66	6.57	6.20	5.82
Wyoming	8.17	8.33	8.77	7.66	7.92	7.74	8.48	8.17	7.67	7.05	6.96
United States	8.05	7.90	7.67	7.53	7.44	7.34	7.31	7.27	7.10	6.88	6.65

DATA SOURCE: Based on MEDPAR data analyzed and presented by the Dartmouth Atlas of Health Care, 2000-2010; The Dartmouth Institute for Health Policy and Clinical Practice.

III. SHOULDER PROCEDURES

These national estimates are based on all-listed procedures, which include all procedures performed during the hospital stay. The unit of analysis is discharge: if a particular procedure occurs multiple times during the same hospital stay, it is only counted once. A person who is admitted to the hospital multiple times in one year is counted each time as a separate “discharge.”

TOTAL SHOULDER REPLACEMENT: 2000-2011

Total Shoulder Replacement is defined as ICD-9-CM procedure code 81.80. These estimates do not include revision procedures.

Year	Discharges	Male	Female	1-17 years	18-44 years	45-64 years	65-84 years	85+ years
2000	7,223	44%	56%	*	4%	29%	62%	5%
2001	8,229	40%	60%	*	3%	28%	64%	5%
2002	10,192	45%	55%	*	3%	31%	62%	4%
2003	10,658	45%	55%	*	3%	30%	63%	3%
2004	15,432	44%	55%	*	2%	30%	64%	3%
2005	16,811	43%	56%	*	2%	29%	64%	4%
2006	20,086	43%	57%	*	2%	28%	66%	4%
2007	23,358	43%	56%	*	2%	27%	67%	4%
2008	26,773	44%	56%	*	2%	27%	67%	4%
2009	33,012	44%	56%	*	1%	28%	66%	5%
2010	39,226	43%	57%	*	1%	28%	66%	4%
2011	29,414	49%	51%	*	2%	34%	61%	3%

*No reliable estimate. Age/sex segments may not add up to 100% because of missing data and rounding.

DATA SOURCE: HCUP Nationwide Inpatient Sample, 2000-2011; Agency for Healthcare Research and Quality.

PARTIAL SHOULDER REPLACEMENT: 2000-2011

Partial Shoulder Replacement is defined as ICD-9-CM procedure code 81.81. These estimates do not include revision procedures.

Year	Discharges	Male	Female	1-17 years	18-44 years	45-64 years	65-84 years	85+ years
2000	11,398	28%	72%	*	5%	25%	62%	8%
2001	13,551	29%	71%	*	4%	24%	62%	9%
2002	14,988	30%	70%	*	5%	26%	60%	9%
2003	15,290	30%	69%	*	4%	26%	62%	7%
2004	17,232	31%	69%	*	4%	28%	61%	7%
2005	17,883	33%	66%	*	4%	28%	60%	7%
2006	18,052	34%	66%	*	5%	30%	57%	7%
2007	18,061	35%	65%	*	5%	32%	56%	8%
2008	20,178	37%	62%	*	4%	32%	56%	8%
2009	19,394	34%	66%	*	4%	30%	57%	8%
2010	18,713	36%	64%	*	5%	34%	53%	8%
2011	15,860	37%	62%	*	6%	35%	51%	8%

*No reliable estimate. Age/sex segments may not add up to 100% because of missing data and rounding.

DATA SOURCE: HCUP Nationwide Inpatient Sample, 2000-2011; Agency for Healthcare Research and Quality.

IV. BACK PROCEDURES

These national estimates are based on principal procedures: the procedure that was performed for definitive treatment rather than one performed for diagnostic or exploratory purposes, or the procedure that was necessary to take care of a complication. If two procedures meet this definition, the one most related to the principal diagnosis is selected as the principal procedure. The unit of analysis is discharge: if a procedure occurs multiple times during the same hospital stay, it is only counted once. A person who is admitted to the hospital multiple times in one year will be counted each time as a separate “discharge.”

SPINAL FUSION: 2000-2011

Spinal Fusion is defined as AHRQ’s CCS principal procedure category 158 – Spinal fusion. These estimates include re-fusion procedures.

Year	Discharges	Male	Female	1-17 years	18-44 years	45-64 years	65-84 years	85+ years
2000	210,682	49%	51%	4%	36%	43%	17%	1%
2001	252,400	46%	54%	4%	34%	44%	18%	1%
2002	276,984	47%	53%	3%	33%	45%	18%	1%
2003	297,883	46%	54%	3%	31%	46%	20%	1%
2004	303,374	46%	54%	3%	28%	47%	21%	1%
2005	332,159	45%	55%	4%	27%	47%	22%	1%
2006	343,307	46%	54%	3%	26%	48%	22%	1%
2007	350,754	46%	54%	3%	25%	48%	24%	1%
2008	413,171	46%	54%	2%	22%	49%	26%	1%
2009	432,545	46%	54%	2%	21%	49%	27%	1%
2010	463,624	46%	54%	2%	20%	49%	27%	1%
2011	465,070	46%	54%	2%	18%	49%	30%	1%

DATA SOURCE: HCUP Nationwide Inpatient Sample, 2000-2011; Agency for Healthcare Research and Quality.

BACK SURGERY RATE PER 1,000 MEDICARE ENROLLEES: 2000-2010

State	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Alabama	4.94	5.32	5.55	5.42	5.77	5.77	5.98	6.19	6.27	6.17	6.09
Alaska	2.92	3.14	2.46	3.19	3.07	3.27	3.11	3.69	4.51	4.62	5.10
Arizona	4.13	4.26	4.36	4.36	4.43	4.34	4.29	4.52	4.50	5.04	5.05
Arkansas	3.53	3.82	4.06	4.39	4.70	4.35	4.97	5.00	5.16	5.31	5.40
California	3.41	3.57	3.61	3.68	3.78	3.77	4.01	4.15	4.24	4.40	4.34
Colorado	4.44	4.71	5.27	5.12	5.76	6.13	5.68	6.05	6.39	6.78	6.54
Connecticut	2.88	3.11	3.03	3.27	3.28	3.21	3.31	3.58	3.42	3.75	3.58
Delaware	3.07	2.80	2.78	2.97	3.07	3.55	3.58	3.50	4.15	3.97	4.18
D.C.	4.13	4.73	4.12	3.74	4.12	4.30	4.17	3.88	4.07	4.30	3.89
Florida	4.20	4.45	4.33	4.50	4.55	4.70	4.95	5.17	5.49	5.57	5.76
Georgia	3.73	4.10	3.96	4.22	4.29	4.47	4.45	4.65	5.21	5.21	5.12
Hawaii	1.53	1.60	1.54	1.64	1.66	1.79	1.77	1.64	1.58	1.44	1.46
Idaho	7.14	7.50	7.62	6.96	7.26	7.63	7.71	7.28	7.31	7.47	6.66
Illinois	3.13	3.41	3.43	3.32	3.40	3.38	3.64	3.81	3.83	3.99	4.14
Indiana	3.23	3.69	3.42	3.53	3.54	3.62	3.74	4.00	4.14	4.38	4.38
Iowa	4.18	4.54	4.79	4.90	4.88	4.65	4.96	4.94	4.80	4.58	4.42
Kansas	3.96	4.55	4.88	5.17	5.76	5.67	5.77	5.31	5.54	5.81	5.51
Kentucky	3.17	3.28	3.56	3.17	3.41	3.55	3.91	3.91	3.85	4.05	4.11
Louisiana	3.56	3.78	4.03	3.93	4.03	4.22	4.95	5.18	5.23	5.07	5.03
Maine	3.12	3.51	3.41	3.26	3.59	3.63	3.34	3.74	3.93	3.80	3.69
Maryland	3.93	4.40	4.36	4.57	4.72	4.92	4.94	4.87	5.04	5.00	4.89
Massachusetts	2.62	3.01	2.92	2.85	3.17	3.27	3.33	3.26	3.46	3.58	3.54
Michigan	4.00	4.47	4.55	4.75	5.06	5.34	5.31	5.51	5.75	5.91	6.20
Minnesota	4.08	4.23	4.58	4.59	4.84	4.94	5.41	5.00	5.56	5.43	5.23
Mississippi	3.74	3.78	3.90	3.64	3.99	4.43	4.74	4.82	4.87	5.08	4.31
Missouri	3.62	4.08	3.75	3.69	4.15	4.18	4.52	4.63	4.88	4.99	4.96
Montana	5.65	6.49	6.80	7.26	7.36	6.65	6.38	5.87	6.09	5.83	6.05
Nebraska	5.01	5.49	5.64	5.70	5.71	5.66	6.60	6.17	6.03	5.90	5.76
Nevada	3.24	3.97	4.82	4.58	5.11	5.36	5.34	5.80	5.47	6.01	6.06

BACK SURGERY RATE (PER 1,000 MEDICARE ENROLLEES) – CONTINUED

State	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
New Hampshire	2.70	2.78	2.45	2.84	2.81	2.86	3.17	2.94	2.97	3.15	2.82
New Jersey	2.02	2.20	2.19	2.16	2.31	2.25	2.32	2.32	2.45	2.49	2.59
New Mexico	2.98	3.31	3.44	3.89	4.28	3.99	3.76	3.92	4.23	4.25	3.99
New York	2.21	2.28	2.28	2.39	2.52	2.47	2.55	2.56	2.64	2.67	2.89
North Carolina	4.09	4.30	4.39	4.52	4.88	4.71	4.63	4.69	4.74	4.74	4.74
North Dakota	3.50	4.10	3.64	4.01	4.06	4.60	4.70	5.42	5.89	5.29	4.91
Ohio	3.58	3.86	4.11	4.17	4.39	4.13	4.44	4.62	4.71	4.91	4.90
Oklahoma	4.31	4.70	4.94	5.04	5.13	5.14	5.42	5.49	5.68	6.14	6.19
Oregon	6.17	6.79	6.39	6.86	6.68	6.70	7.04	6.92	6.51	6.91	6.62
Pennsylvania	3.29	3.47	3.50	3.61	3.71	3.88	4.12	4.04	4.21	4.26	4.22
Rhode Island	2.89	3.08	3.21	3.21	3.17	2.62	3.32	2.88	3.79	3.70	4.22
South Carolina	4.11	4.42	4.85	4.90	5.27	5.10	5.23	5.52	6.02	6.12	6.15
South Dakota	5.69	5.72	5.65	5.03	5.12	6.35	6.37	6.20	5.26	5.43	5.16
Tennessee	3.53	3.69	3.72	3.51	3.78	3.88	4.07	4.38	4.63	4.75	4.54
Texas	3.93	4.29	4.28	4.25	4.81	4.88	4.93	4.83	5.23	5.35	5.34
Utah	4.90	5.04	4.56	5.28	5.02	5.55	5.59	5.46	5.77	5.77	5.96
Vermont	2.02	2.27	2.12	2.44	2.67	2.35	2.17	2.41	2.50	2.62	2.56
Virginia	4.00	4.23	4.04	4.26	4.80	4.56	4.92	4.92	5.01	5.07	4.98
Washington	4.54	4.91	4.80	4.82	5.41	5.33	5.40	5.31	5.29	5.59	5.56
West Virginia	2.58	2.62	2.54	2.75	3.06	3.08	2.92	2.90	3.53	3.24	3.24
Wisconsin	3.25	3.45	3.59	3.91	4.22	4.28	4.14	3.85	3.85	4.01	3.86
Wyoming	7.37	8.12	8.79	8.65	8.94	9.55	10.78	9.98	8.73	9.92	8.86
United States	3.61	3.89	3.92	4.00	4.22	4.26	4.41	4.47	4.63	4.74	4.74

DATA SOURCE: Based on MEDPAR data analyzed and presented by the Dartmouth Atlas of Health Care, 2000-2010; The Dartmouth Institute for Health Policy and Clinical Practice.