

STATISTICAL BRIEF #23

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Bariatric Surgery Utilization and Outcomes in 1998 and 2004

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Introduction

Morbid obesity is recognized as a major public health issue that contributes to serious health risks. Bariatric surgery has been demonstrated as a successful method of achieving dramatic weight loss among the morbidly obese. A recent meta-analysis found that 62–70 percent of excess weight was lost following gastric bypass surgery. Following successful weight loss, diabetes was completely resolved in 76.8 percent of patients.¹ Bariatric surgery is recommended for patients with a body mass index (BMI) ≥ 40 , or a BMI ≥ 35 with serious medical conditions (such as severe sleep apnea, obesity-related cardiomyopathy, or diabetes mellitus).

A recent AHRQ study found that the number of bariatric surgeries grew by 400 percent between 1998 and 2002.² This Statistical Brief updates that research and presents data from the Healthcare Cost and Utilization Project (HCUP) on national estimates of bariatric surgery use and costs from 1998 to 2004.

Findings

Bariatric surgery utilization and costs, by payer

Table 1 presents national estimates of bariatric surgery utilization, costs, and costs per surgery by payer. From 1998 to 2004, the total number of surgeries increased nine times, from 13,386 to 121,055. In 2004, privately insured patients accounted for 78.4 percent of surgeries, up slightly from 76.0 percent in 1998. Medicare, Medicaid, and the uninsured accounted for 7.4, 5.4, and 5.3 percent, respectively, of surgeries in 2004. The remaining 3.4 percent of surgeries were paid by other payers, including government sources and charity.

From 1998 to 2004, the largest increase in surgeries was for the privately insured, a 9.3-fold increase. Surgeries among uninsured patients increased 9.1 times over the seven-year period. The number of bariatric surgeries for Medicare, Medicaid, and other payers increased 8.2, 7.0, and 8.8 times, respectively.

¹H. Buchwald et al., "Bariatric Surgery: A Systematic Review and Meta-Analysis," *Journal of the American Medical Association* 292, no. 14 (2004): 1724–1737.

²W. Encinosa, Bernard, D., Steiner, C. and Chen, C. Use and Costs of Bariatric Surgery and Prescription Weight-Loss Medications. *Health Affairs* 24(4):1039–1045, 2005.

Highlights

- From 1998 to 2004, the total number of bariatric surgeries increased nine-fold, from 13,386 to 121,055.
- Across all age groups, the fastest growth in bariatric surgeries occurred among adults aged 55 to 64, a twenty-fold increase, from 772 surgeries in 1998 to nearly 16,000 surgeries in 2004.
- The national inpatient death rate associated with bariatric surgery declined 78.7 percent, from 0.89 percent in 1998 to 0.19 percent in 2004. In 2004, 230 patients died in hospital stays during which bariatric surgery was performed.
- In 2004, the inpatient death rate for men was 2.8 times higher than the rate among women, down from six times higher in 1998.
- Total national inpatient hospital costs for bariatric surgeries increased by more than eight times, from \$147 million in 1998 to \$1.26 billion in 2004 (in 2004 dollars).
- The national average cost for a hospital stay during which bariatric surgery was performed decreased by 5.2 percent from 1998 to 2004 (in 2004 dollars).
- Total costs for the privately insured were 8.9 times higher in 2004 than in 1998—the largest increase among any group. The second largest increase was for uninsured patients, for whom total costs increased 8.6 times (in 2004 dollars).
- An increasing number of adolescents (12–17 years old) are receiving bariatric surgery, an estimated 349 in 2004.
- Women accounted for 82.0 percent of all bariatric surgeries in 2004.

National inpatient hospital costs for bariatric surgeries (excluding physician costs) increased by more than eight times from \$147 million in 1998 to \$1.26 billion in 2004, in constant 2004 dollars. Hospital costs for the privately insured in 2004 was \$982 million, accounting for 78.1 percent of all hospital bariatric costs across all payers. Between 1998 and 2004, the largest increase in total costs, an 8.9-fold increase, was found among the privately insured. The second largest increase was for uninsured patients, for whom total costs increased 8.6 times.

Nationally, the average cost for a hospital stay during which bariatric surgery was performed in 2004 was \$10,395. From 1998 to 2004, hospital costs per bariatric surgery stay declined 5.2 percent. This is most likely explained by the 38.5 percent decline in the length of stay. The hospital cost per bariatric surgery stay was highest for Medicare in both years. The uninsured had the lowest average hospital cost per stay. In 2004, the average cost per bariatric surgery stay for Medicare was 25.9 percent higher than for uninsured patients. Compared to other payer groups, the average hospital cost per bariatric surgery stay for Medicare and uninsured patients decreased the most from 1998 to 2004, at 9.2 percent and 7.9 percent, respectively. (The length of stay declined the most for uninsured patients and the privately insured, not shown.)

Bariatric surgery utilization and outcomes, by age and sex

Table 2 presents national estimates of the number of surgeries, lengths of stay, and inpatient death rates, by age and sex. In 2004, patients age 18–54 accounted for 85.2 percent of all surgeries, while the near elderly (age 55–64) accounted for 13.1 percent. Adolescents and the elderly accounted for the remaining 1.5 percent. Generally, the number of bariatric surgeries between 1998 and 2004 increased for all age groups. The fastest growth in bariatric surgeries occurred among the near elderly, for whom the number of surgeries increased more than 20 times. While length of stay and mortality decreased for all age groups over time, older patients had the highest length of stay and highest inpatient mortality rate.

More women underwent bariatric surgery than men. Women accounted for 82.0 percent of all surgeries in 2004. Between 1998 and 2004, the numbers of bariatric surgeries increased over nine times for women and over eight times for men. Length of stay and inpatient death rate remained higher among men. In 2004, the inpatient death rate for men was 2.8 times higher than the rate among women, down from six times higher in 1998.

Length of stay and the inpatient death rate declined for each age and sex group from 1998 to 2004. Overall, the length of stay declined 38.5 percent for all surgeries from nearly five days in 1998 to 3.1 days in 2004, and the inpatient death rate declined 78.7 percent from 0.89 percent to 0.19 percent. In 2004, 230 patients died in hospital stays during which bariatric surgery was performed.

Data Source

The estimates in this Statistical Brief are based on data from the HCUP 1998 and 2004 Nationwide Inpatient Sample (NIS).

Definitions

Types of hospitals included in HCUP

HCUP is based on data from community hospitals, defined as short-term, non-Federal, general and other hospitals, excluding hospital units of other institutions (e.g., prisons). HCUP data include OB-GYN, ENT, orthopedic, cancer, pediatric, public, and academic medical hospitals. They exclude long-term care, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals, but these types of discharges are included if they are from community hospitals.

Unit of analysis

The unit of analysis is the hospital discharge (i.e., the hospital stay), not a person or patient. This means that a person who is admitted to the hospital multiple times in one year will be counted each time as a separate "discharge" from the hospital.

Costs and charges

Total hospital charges were converted to costs using HCUP cost-to-charge ratios based on hospital accounting reports from the Centers for Medicare and Medicaid Services (CMS).³ Costs will tend to reflect the actual costs of production, while charges represent what the hospital billed for the case. For each

hospital, a hospital-wide cost-to-charge ratio is used because detailed charges are not available across all HCUP States. Hospital charges reflect the amount the hospital charged for the entire hospital stay and does not include professional (physician) fees. For the purposes of this Statistical Brief, costs are reported to the nearest hundreds.

Payer

Up to two payers can be coded for a hospital stay in HCUP data. When this occurs, the following hierarchy was used:

- If either payer is listed as Medicaid, payer is “Medicaid.”
- For non-Medicaid stays, if either payer is listed as Medicare, payer is “Medicare.”
- For stays that are neither Medicaid nor Medicare, if either payer is listed as private insurance, payer is “private insurance.”
- For stays that are not Medicaid, Medicare or private insurance, if either payer is some other third party payer, payer is “other,” which consists of Worker’s Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs.
- For stays that have no third-party payer and the payer is listed as “self-pay” or “no charge,” the payer is “uninsured.”

Diagnoses, ICD-9-CM, and Diagnosis-Related Groups (DRGs)

We identified bariatric surgeries with the following ICD-9-CM all-listed procedure codes:

- 4431 High gastric bypass
- 4438 Laparoscopic gastroenterostomy
- 4439 Other gastroenterostomy
- 4468 Laparoscopic gastroplasty
- 4495 Laparoscopic gastric restrictive procedure
- 4496 Laparoscopic revision of gastric restrictive procedure
- 4497 Laparoscopic removal of gastric restrictive device(s)
- 4498 Laparoscopic adjustment of size of adjustable gastric restrictive device
- 445 with DRG=288 Revision of gastric anastomosis
- 4499 with DRG=288 Other operations on stomach

Next, we excluded cases with stomach and intestinal cancers with the following ICD-9-CM diagnosis codes:

- 1500 to 1599 Stomach and intestinal cancers
- 2301 to 2309 In-situ cancers

Finally, we excluded cases without any of the following ICD-9-CM obesity diagnosis codes: 27801, 2780, 27800, and V778.

About the NIS

The HCUP Nationwide Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, non-rehabilitation hospitals). The NIS is a sample of hospitals and includes all patients from each hospital, regardless of payer. It is drawn from a sampling frame that contains hospitals comprising 88 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at both the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use.

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

³HCUP Cost-to-Charge Ratio Files (CCR). Healthcare Cost and Utilization Project (HCUP). 2001–2003. U.S. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp.

organizations, hospital associations, private data organizations, and the Federal government—to create a national information resource.

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

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

Arizona Department of Health Services
Arkansas Department of Health & Human Services
California Office of Statewide Health Planning & Development
Colorado Health & Hospital Association
Connecticut Integrated Health Information (Chime, Inc.)
Florida Agency for Health Care Administration
Georgia GHA: An Association of Hospitals & Health Systems
Hawaii Health Information Corporation
Illinois Health Care Cost Containment Council and Department of Public Health
Indiana Hospital & Health Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Maryland Health Services Cost Review Commission
Massachusetts Division of Health Care Finance and Policy
Michigan Health & Hospital Association
Minnesota Hospital Association
Missouri Hospital Industry Data Institute
Nebraska Hospital Association
Nevada Division of Health Care Financing and Policy, Department of Human Resources
New Hampshire Department of Health & Human Services
New Jersey Department of Health & Senior Services
New York State Department of Health
North Carolina Department of Health and Human Services
Ohio Hospital Association
Oregon Office for Oregon Health Policy and Research and Oregon Association of Hospitals and Health Systems
Rhode Island Department of Health
South Carolina State 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 & Family Services

For additional HCUP statistics, visit HCUPnet, our interactive query system at www.hcup.ahrq.gov.

For More Information

For a detailed description of HCUP and more information on the design of the NIS and methods to calculate estimates, please refer to the following publications:

Steiner, C., Elixhauser, A., Schnaier, J. The Healthcare Cost and Utilization Project: An Overview. *Effective Clinical Practice* 5(3):143–51, 2002.

Design of the HCUP Nationwide Inpatient Sample, 2004. Online. August 8, 2006. U.S. Agency for Healthcare Research and Quality. http://www.hcup-us.ahrq.gov/db/nation/nis/reports/NIS_2004_Design_Report.pdf

Houchens, R., Elixhauser, A. *Final Report on Calculating Nationwide Inpatient Sample (NIS) Variances, 2001*. HCUP Methods Series Report #2003-2. Online. June 2005 (revised June 6, 2005). U.S. Agency for Healthcare Research and Quality. <http://www.hcup-us.ahrq.gov/reports/CalculatingNISVariances200106092005.pdf>

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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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Table 1. National estimates of bariatric surgery utilization and costs, by payer, 1998 and 2004

Payer	1998	2004	Percent change
<i>Number of surgeries</i>			
Total	13,386 (2,021)	121,055 (11,609)	804%
Private	10,167 (1,528)	94,947 (9,228)	834
Medicare	1,106 (209)	9,015 (1,042)	715
Medicaid	940 (218)	6,560 (1,116)	598
Uninsured	704 (197)	6,408 (1,190)	810
Other	469 (192)	4,125 (817)	780
<i>Hospital costs (millions)</i>			
Total	\$147 (22)	\$1,258 (122)	756
Private	110 (17)	982 (98)	793
Medicare	14 (3)	106 (12)	657
Medicaid	11 (3)	72 (11)	555
Uninsured	7 (2)	60 (11)	757
<i>Mean cost per surgery</i>			
All Payers	\$10,970 (535)	\$10,395 (474)	-5.2
Private	10,776 (568)	10,346 (510)	-4.0
Medicare	12,987 (990)	11,795 (511)	-9.2
Medicaid	11,982 (1,510)	11,051 (1,056)	-7.8
Uninsured	10,173 (1,142)	9,365 (672)	-7.9

Note: Standard errors are in parentheses. Costs are in 2004 dollars and include inpatient costs only.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1998 and 2004.

Table 2. National estimates of bariatric surgery use and outcomes, by age and sex, 1998 and 2004

	Number of surgeries			Length of stay (days)		Inpatient death rate (percent)	
	1998	2004	Percent change	1998	2004	1998	2004
<i>Age (years)</i>							
12-17	--	349 (60)	--	--	2.2 (0.1)	--	0.00 (0.00)
18-34	4,336 (636)	30,445 (2,837)	602%	4.4 (0.2)	2.8 (0.1)	0.47 (0.21)	0.03 (0.02)
35-44	4,825 (638)	36,748 (3,212)	662	4.9 (0.2)	3.0 (0.1)	1.10 (0.40)	0.15 (0.04)
45-54	3,320 (472)	35,904 (3,197)	981	5.6 (0.3)	3.2 (0.1)	0.91 (0.38)	0.27 (0.06)
55-64	772 (114)	15,806 (1,433)	1,947	5.7 (0.5)	3.5 (0.1)	0.00 (0.00)	0.37 (0.12)
65+	--	1,423 (207)	--	--	3.9 (0.4)	--	0.93 (0.55)
<i>Sex</i>							
Male	2,527 (365)	20,977 (2,060)	730%	5.9 (0.3)	3.5 (0.1)	2.76 (0.65)	0.42 (0.10)
Female	10,859 (1,650)	99,310 (9,375)	815	4.8 (0.2)	3.0 (0.1)	0.46 (0.15)	0.15 (0.03)
Total	13,386 (2,021)	121,055 (11,609)	804%	4.99 (0.21)	3.07 (0.08)	0.89 (0.20)	0.19 (0.03)

Note: Standard errors are in parentheses. The number of surgeries in age groups 12-17 and 65+ for 1998 is too small to provide a reliable estimate.

Source: AHRQ, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 1998 and 2004.