
A Decade Analysis of Trends and Outcomes of Bariatric Surgery in Medicare Beneficiaries



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- BACKGROUND:** In 2006, the Centers for Medicare and Medicaid Services issued a National Coverage Determination (NCD), which mandates that bariatric procedures be performed only at accredited centers. The aim of this study was to analyze outcomes of Medicare beneficiaries who underwent bariatric surgery before (2001 through 2005) vs after (2006 through 2010) implementation of the NCD.
- STUDY DESIGN:** The Nationwide Inpatient Sample database was used to analyze data on patients who underwent bariatric surgery between 2001 and 2010. Main outcomes measures were demographics, length of stay, risk-adjusted inpatient morbidity and mortality, and cost.
- RESULTS:** There were 775,040 patients who underwent bariatric surgery, with 16% of the patients Medicare beneficiaries. There was an overall trend for improved in-hospital mortality during the decade (0.35% in 2001 to 0.10% in 2010). Medicare patients who underwent bariatric surgery had higher rates of comorbidities and a higher rate of in-hospital mortality than non-Medicare patients. After the NCD, there was a significant reduction of the in-hospital mortality (0.56% vs 0.23%; $p < 0.01$) and serious morbidity (9.92% vs 6.98%; $p < 0.01$) for Medicare patients and a similar reduction of the in-hospital mortality (0.18% vs 0.08%; $p < 0.01$) and serious morbidity (6.84% vs 5.08%; $p < 0.01$) for non-Medicare patients. Compared with patients who underwent stapling bariatric procedures at accredited centers, patients at nonaccredited centers had higher risk-adjusted in-hospital mortality (odds ratio = 3.53; 95% CI, 1.01–6.52) and serious morbidity (odds ratio = 1.18; 95% CI, 1.07–1.30). After the NCD, use of bariatric surgery within Medicare beneficiaries increased by 71%.
- CONCLUSIONS:** Outcomes of bariatric surgery in Medicare beneficiaries have improved substantially since the 2006 NCD. Facility accreditation appears to be a contributing factor to the observed improvement in outcomes. (J Am Coll Surg 2014;219:480–488. © 2014 by the American College of Surgeons)
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The Centers for Medicare and Medicaid Services (CMS) is currently providing care for an estimated 50.8 million Medicare beneficiaries, comprising approximately 16% of

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the US population.¹ In September 2013, CMS overturned a component of its 2006 National Coverage Determination (NCD), which limited bariatric surgery to centers accredited by the American College of Surgeons or the American Society for Metabolic and Bariatric Surgery. The criteria for accreditation currently includes a threshold yearly procedure volume, experienced surgeons who specialize in bariatric surgery, trained ancillary staff, a multidisciplinary team, and having appropriate equipment to accommodate morbidly obese patients. A reversal of the facility certification decision was made despite ample evidence showing improved outcomes after the NCD without impeding access to care for the Medicare beneficiaries.^{2–6} The recent CMS decision to forgo facility accreditation requirement will now allow Medicare patients to undergo bariatric surgery at

Abbreviations and Acronyms

CMS = Centers for Medicare and Medicaid Services
NCD = National Coverage Determination
NIS = Nationwide Inpatient Sample
OR = odds ratio

any facility without regard for the center's commitment to care for bariatric surgery patients, availability of appropriate equipment and trained staff, or having requisite case-volume experience. This decision might place Medicare patients undergoing bariatric surgery at risk for higher morbidity and mortality rates. The aim of this study was to analyze the outcomes of bariatric surgery at a national level for both Medicare and non-Medicare patients who underwent bariatric surgery before vs after the NCD was issued. Additionally, we aimed to understand the impact of accreditation on outcomes by examining the outcomes of non-Medicare patients who underwent bariatric surgery after the NCD at accredited vs nonaccredited centers. Lastly, we aimed to analyze the use of bariatric surgery by Medicare beneficiaries before vs after the NCD to determine if there are any barriers to obtaining access to bariatric surgical care.

METHODS**Database**

The Nationwide Inpatient Sample (NIS) database is the largest all-payer inpatient care database currently available in the United States. It contains information on approximately 8 million hospital stays per year from 1,000 hospitals across the country. The large sample size enables analysis of specific patient populations and procedures. The NIS data approximate a 20% stratified sample of US community, nonmilitary, and nonfederal hospitals, which provides a sampling frame that represents roughly 95% of all hospital discharges in the nation. Inpatient data are collected from hospital discharge abstracts and billing records that contain patient demographics, inpatient procedures, hospital length of stay, morbidity, in-hospital mortality, and hospital charges. Approval for the use of the NIS patient-level data in this study was obtained from the Institutional Review Board of the University of California Irvine Medical Center and from the Healthcare Cost and Utilization Project.

Selection and description of participants

Using the NIS database from 2001 through 2010, we identified all morbidly obese patients undergoing elective admission for bariatric surgery. Appropriate diagnosis and procedural codes were selected using the ICD-9-CM.

Principle diagnosis codes used were obesity and morbid obesity (278.0, 278.00, and 278.01). The ICD-9 procedural codes included laparoscopic gastric banding (44.95), laparoscopic sleeve gastrectomy (43.82 and 44.68), laparoscopic Roux-en-Y gastric bypass (44.38), and open Roux-en-Y gastric bypass (44.31 and 44.39). Patients who underwent emergent procedures were excluded from analysis.

The cohort was first divided by payer type: "Medicare" (Medicare and Medicaid) compared with "non-Medicare" (private and other payers) patients. Medicare represents coverage for people 65 years of age and older or those younger than 65 years with a disability. Individuals who received both Medicare and Medicaid were included in our analysis because many beneficiaries are dual eligible.

Trends of in-hospital mortality were analyzed by year, comparing Medicare vs non-Medicare patients who underwent bariatric surgery between 2001 and 2010. The number of bariatric procedures performed among Medicare beneficiaries was analyzed by year for 2001 through 2010. Outcomes of Medicare and non-Medicare patients who underwent bariatric surgery before vs after the NCD were analyzed. The period before the NCD was defined as 2001 through 2005 and the period after the NCD was defined as 2006 through 2010. Lastly, a subgroup analysis was performed examining the outcomes of non-Medicare patients who underwent stapling bariatric procedures (gastric bypass or gastric sleeve) after the 2006 NCD (2006 through 2010) performed at accredited vs nonaccredited centers. Accredited centers were identified according to the CMS website listing for facility certification. Specific American hospital association codes within the NIS were used to categorize accredited and nonaccredited facilities.

Outcomes variables

Patient demographics (age, sex, and ethnicity), comorbidities, and outcomes were compared based on Medicare vs non-Medicare payer status, time period, and hospital accreditation status. Any missing demographic data were excluded from analysis. Primary outcomes measures included rate of in-hospital mortality and serious morbidity. In-hospital mortality rate was defined as the percentage of patients who died before being discharged from the hospital. The NIS database does not include information on deaths that occurred after discharge or on hospital readmission. Serious morbidity was defined as anastomotic leak, sepsis, pulmonary empyema/abscess, acute renal failure, acute respiratory failure, cardiac complications, cerebrovascular accidents, deep venous thrombosis, and wound complications. Secondary outcomes measures were length of hospital stay, specific complications, and mean hospital charges.

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