

## Demographics and outcomes at American Society for Metabolic and Bariatric Surgery Centers of Excellence

Gary M. Pratt · Chris A. Learn · Gail D. Hughes ·  
Bobby L. Clark · Mike Warthen · Walter Pories

Received: 12 April 2008 / Accepted: 23 June 2008 / Published online: 30 January 2009  
© Springer Science+Business Media, LLC 2009

### Abstract

**Introduction** Surgery is currently an effective long-term therapy for morbid obesity and its complications. A variety of surgical procedures can now offer durable and safe weight control as well as previously unrealized full remission of costly comorbidities. This is a preliminary investigation of patient characteristics and outcomes at Bariatric Surgery Centers of Excellence<sup>®</sup> (BSCOE<sup>®</sup>) hospitals.

**Methods and procedures** Data were analyzed from 235 American Society for Metabolic and Bariatric Surgery (ASMBS) BSCOE<sup>®</sup> hospitals receiving Full Approval status from August 2005 to May 2007. Metrics for the 66,339 bariatric surgeries performed at these hospitals included type, volume and distribution of various bariatric surgical procedures performed at each hospital, patient demographics, payer information, and adverse outcomes.

**Results** Data from these analyses demonstrate significant differences in terms of surgical procedure selection (laparoscopic gastric bypass 61%), patient demographics (females 83%, White 60%, mean age 43 years) and type of

payer (private insurance 78%), and adverse outcomes (readmission 5%, re-operation 2%, mortality 0.36%).

**Conclusions** The collective performance of ASMBS BSCOE hospitals in bariatric outcomes of readmissions, re-operations, and mortality are equivalent to, or more favorable, than currently reported outcomes. However, risk assessment and risk adjustment of the patients and each of the bariatric procedures will be necessary to appropriately evaluate these rates.

**Keywords** Obesity · Bariatric surgery · Centers of Excellence · Surgical Review Corporation · Gastric bypass · Comorbidities

Bariatric surgery is a complex and challenging health care undertaking for both patient and provider. Faced with these issues, the leadership of the American Society for Metabolic and Bariatric Surgery (ASMBS) identified the need to recognize surgeons and hospitals that perform at a high level to promote optimal outcomes. To implement and manage this process, the leaders of the ASMBS founded the Surgical Review Corporation (SRC) in November, 2003 as an independent, nonprofit corporation [1]. Four years from its inception, SRC has independently designated Bariatric Surgery Center of Excellence (BSCOE) Full Approval status to 235 hospitals and 470 surgeons in the United States based on their data verified by site inspections. In addition, 281 hospitals have been designated with Provisional Status based on their reported but not verified data. These numbers are expected to exceed more than 500 hospitals and 1,000 surgeons by the time all applications are processed, reviewed, and deemed eligible for BSCOE Full Approval status.

<sup>®</sup>A registered trademark of the American Society for Metabolic and Bariatric Surgery. All rights reserved. Used by permission.

G. M. Pratt (✉) · C. A. Learn · M. Warthen · W. Pories  
Surgical Review Corporation, 4800 Falls of Neuse Road,  
Raleigh, NC 27609, USA  
e-mail: Gary.Pratt@surgicalreview.org

C. A. Learn · G. D. Hughes · W. Pories  
Department of Surgery, Brody School of Medicine,  
East Carolina University, Greenville, NC 27858, USA

B. L. Clark  
Clark & Associates Statistical Consulting, 201 Gillespie Drive,  
Suite 8205, Franklin, TN 37067, USA

Bradley et al. have recently documented the significant merit of the Blue Cross and Blue Shield of North Carolina Bariatric Surgery Centers of Excellence (COE) programs in terms of improved outcomes reported for patients operated at those centers [2]. Specifically, the authors demonstrated that COE providers achieved reduced 30-day readmission rates, overall reductions in the rate and number of procedures performed as well as the number of physicians performing them. Furthermore, while the involved programs did not provide financial incentives for patients or providers to use a COE for their surgery, the proportion of bariatric procedures performed by COE member programs increased from 55% during the year before COE implementation to 61% during the first year (2005). For patient, provider and payer alike, COE's improved quality of care and better outcomes through evidence-based practice provides rewards for all.

The SRC's COE program goes far beyond the limited systems of single carriers with an expansive national network of providers. To participate, hospitals and surgeons applying for ASMBS BSCOPE Full Approval are invited to complete a Provisional Status application for initial consideration by SRC's Clinical Quality and Compliance (CQC) Division. Following successful completion of the requirements, these hospitals and surgeons are then invited to submit an application for Full Approval. If the application receives favorable review, the applicant surgeon's and hospital's complete bariatric surgical care facilities, resources, and personnel are evaluated with a site inspection. Unlike investigations which are restricted to the experience of a single payer [2], the data provided by SRC are from a variety of hospitals and payers across the United States, providing a unique opportunity to investigate, and describe aggregate data on ASMBS BSCOPE demographics and outcomes.

## Methodology

As a part of the Full Approval application to become an ASMBS BSCOPE, applicant hospitals provide aggregate clinical data from the past 12 months for a minimum of 125 cases over that period. For the purposes of the investigations described here, 516 hospitals applied for ASMBS BSCOPE Full Approval status (August 2005 through May 2007) and as such were required to submit aggregate bariatric surgery metrics in the form of volume and types of various bariatric surgical procedures performed, patient demographics (age, sex, race/ethnicity), payer information, and patient outcomes [readmissions, re-operations, mortalities (inpatient and post-discharge  $\leq 90$  days)] per definition in the application. In total over this time period, 235 hospitals were granted Full Approval status, and only these institutions were included in the analyses described

herein, i.e., hospitals granted Provisional Status and all non-BSCOPE were excluded.

## Data entry and quality control

All reported data for each Full Approval hospital application were entered remotely by the applicant institution into a secure database that resides on-site at SRC. This database is continuously monitored by SRC Information Services. All entered and compiled data were double checked for application validity and accuracy. A mandatory site inspection by the SRC Clinical Quality and Compliance Division validated both federal and local regulatory compliance, monitoring, reporting, data management, and record keeping. Applications were subject to updating by applicant institutions up to the time of site inspection, in order to reflect the most current data and information available through the review process by 3 of the 24 members of the SRC Bariatric Surgical Review Committee (BSRC). Following successful review of each application and corresponding site inspection report, applicant hospitals were designated BSCOPE Full Approval status by the BSRC. As part of the Full Approval BSCOPE application, hospitals were asked to report patient outcomes for the following areas: readmissions within 30 days, re-operations within 30 days, inpatient mortality, post-discharge 30-day mortality, and 31–90 day mortality (Fig. 1). From these data, overall total mortality for  $\leq 90$  days postoperatively was calculated as recommended by ASMBS and SRC.

## Statistical analysis

For data mining and processing, all raw aggregate data were analyzed by univariate analysis. Corresponding calculations for each bariatric surgery metric were performed and all data were reviewed and triple checked for consistency and accuracy. All statistical analyses were verified using SAS version 8.0 (SAS Institute, Inc., Cary, NC).

## Results

### BSCOPE patient characteristics

Table 1 summarizes BSCOPE patient characteristics. In the 66,339 bariatric surgeries reported, and consistent with other reports in the literature [1, 2], women (83%) outnumbered men (18%), by a ratio of greater than 5.5 to 1. In regard to average patient age, the minimum, mean ( $\pm$  standard deviation), and maximum ages for all patients were 18, 43 ( $\pm 3$ ), and 68 years, respectively.

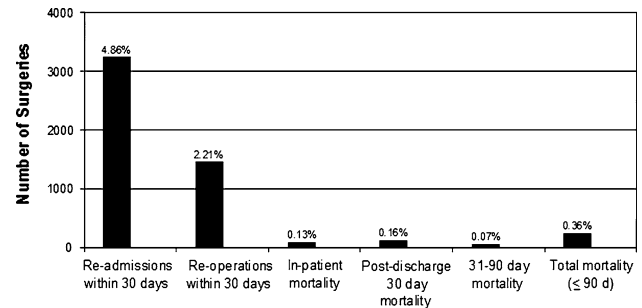
Whites represented 60% of all bariatric surgery patients, while African-Americans were the second most represented group at 11%. The remaining ethnicities by decreasing volume were Hispanics (5%), Native Americans (0.2%), and Asians (0.1%), constituting less than 6% of all bariatric surgery patients combined. Patients for which race/ethnicity were not reported totaled 25% (data not shown). Private insurance (78%) was the predominant form of payment. Other insurance (9%), uninsured/self-pay (6%), Medicaid (5%), and Civilian Health And Medical Program of the Uniformed Services (CHAMPUS) (2%) were the remaining most common forms of payment.

Total bariatric surgeries at 235 ASMBS BSCOE (August 2005 to May 2007)

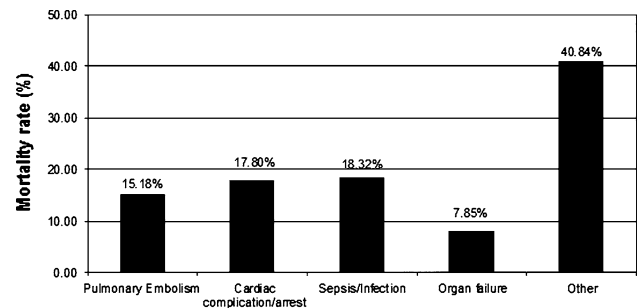
Fewer than 5% of the 66,339 bariatric surgeries performed were biliopancreatic diversions, gastric sleeves, duodenal switches, vertical-banded gastroplasties or revisions combined. Approximately 12% were laparoscopic adjustable gastric bands, 21% were open gastric bypasses, and 60% were laparoscopic gastric bypasses.

**Table 1** Patient characteristics ( $n = 66,339$  bariatric surgeries)

Variable	Mean (or %)	Standard deviation
Mean age, years	43.04	$\pm 2.92$
Female sex	82.55%	$\pm 6.89$
Race/ethnicity		
White	59.45%	$\pm 22.94$
African American	10.69%	$\pm 11.28$
Hispanic	4.52%	$\pm 11.05$
Native American	0.24%	$\pm 0.87$
Asian	0.09%	$\pm 0.62$
Type of insurance coverage		
Private insurance	77.87%	$\pm 26.37$
Other insurance	8.96%	$\pm 18.43$
Uninsured/self-pay	5.95%	$\pm 8.40$
Medicare	5.25%	$\pm 8.50$
CHAMPUS	1.97%	$\pm 5.67$
Type of surgery		
Gastric Bypass—Laparoscopy	60.51%	$\pm 31.18$
Gastric bypass—open	21.44%	$\pm 26.95$
Adjustable band	12.49%	$\pm 21.34$
Revisions	3.24%	$\pm 4.04$
Vertical-banded gastroplasty	1.30%	$\pm 8.96$
Duodenal switch	0.81%	$\pm 7.82$
Gastric sleeve	0.19%	$\pm 1.50$
Biliopancreatic diversion	0.02%	$\pm 0.09$



**Fig. 1** Patient outcomes for all bariatric surgeries ( $n = 66,339$ ) reported at 235 ASMBS BSCOE hospitals



**Fig. 2** Reported cause of mortality ( $n = 191$ ) reported at 235 ASMBS BSCOE hospitals

#### Reported cause of mortality

There were 191 deaths (Fig. 2) with 15% pulmonary embolism ( $n = 29$ ), 18% cardiac complication and/or arrest ( $n = 34$ ), and 18% sepsis/infection ( $n = 35$ ). The remaining “other” 41% ( $n = 78$ ) deaths were reported to result from varying degrees of hemorrhage, drug toxicity, surgical complication(s), unrelated disease or unknown. However, it should be noted that no suspected cause in this group was overrepresented or predominant. As such, pulmonary emboli, cardiac complications, and severe infections were found to be the three predominant causes of mortality.

#### Patient outcomes following bariatric surgery

Aggregate readmission and re-operation rates were 5% and 2%, respectively (Fig. 1). There was a slight increase in deaths post-discharge at the 30-day period (0.16%) compared to in-patient (0.13%) and 31–90 day mortality (0.07%). The analysis of all Full Approval BSCOE hospitals returned a composite mortality rate of 0.36%.

#### Discussion

Current reports have convincingly demonstrated that obesity has become a global crisis and epidemic, especially

in the United States [3, 4]. Obesity population percentage statistics have reached double digits in countries around the world without regard to race or socioeconomic status [5, 6]. The World Health Organization (WHO) estimates there are 300 million obese [body mass index (BMI) over 30 kg/m<sup>2</sup>] people worldwide [7]. Bariatric surgery is the most effective therapy for morbid obesity and the associated comorbidities, but requires complex and challenging solutions and applications [8, 9]. Based on aggregate data taken from the ASMBS BSCOE Full Approval hospital application, the SRC Research Division has extracted and quantified all available statistical information reported. These application data provided sufficient information to generate retrospective analyses in regard to our patient populations.

Similar to reports in the recent literature [10, 11], the overall preferences for type of bariatric surgery are reflected by these data, and our analyses showed that patient outcomes following bariatric surgery at ASMBS BSCOEs are comparable or superior to rates for readmissions, re-operations, and mortality demonstrated elsewhere [5, 12, 13]. In addition, we observed that election of a particular surgical procedure, patient demographics, and payer representation at ASMBS BSCOEs are highly skewed, with substantially more patients being female, White, in their early 40 s, and whose treatment is predominately covered by private insurance or self-payment. The response for Medicare participants is inadequate to address in this paper. While meaningful outcomes are being achieved for metabolic disease and costly comorbidities primarily for this population of patients, national statistics suggest that this may not be the only population in need of bariatric surgery. Data from the U.S. Centers for Disease Control (CDC) suggest that the burden of obesity resides disproportionately in minority and/or disenfranchised populations [7, 10], and is typically manifest in poorly controlled, lifelong, costly comorbidities including type II diabetes [14], hypertension [13], and cardiovascular disease [15], to name but a few. Given that this patient population is historically underinsured or uninsured [12], accessibility to bariatric surgery for many in need has not been achieved to date. In addition, access to bariatric surgery may also be limited for other patient populations due to factors other than finances and insurance, i.e., social stigmas for youths. Our demographics data clearly support this notion, and as such SRC continues to work with both providers and payors to improve access for all of those who could benefit from this potentially life-saving surgery and its supportive care.

While reported outcomes at ASMBS BSCOEs are highly encouraging, we believe that performance at these centers can and will be improved through continued applications of evidence-based medicine. To this end, SRC

launched the Bariatrics Outcomes Longitudinal Database™ (BOLD™) in the summer of 2007. BOLD was specifically designed to capture comprehensive clinical metrics in regard to surgical performance, comorbidities, medications, outcomes, and adverse events, which are just some of the many metrics captured for every patient. From these data, it is anticipated that collection of comprehensive clinical metrics will provide better information that will help to further resolution of chronic and costly comorbidities, such as diabetes [14, 16] and cardiovascular disease [15] as well as mortality [16, 17]. Through the application of the data reported here and in conjunction with BOLD, SRC's next steps for the ASMBS BSCOE program will be to standardized performance and outcomes. These efforts will enhance value for patients, providers, and payors alike in the forms of risk stratification, resolution of comorbidities, development of standard clinical pathways, and long-term outcomes.

For these analyses, it should be noted that there are several limitations to be considered for the data reported in the full approval applications which were analyzed here. Primarily, data were self-reported per each applicant hospital over a period of approximately 2 years, were aggregate in format, and all analyses were retrospective in nature. Nevertheless, we believe the outcomes that are observed for these reported data sets are real, and consistent with similar reports in the bariatric surgery literature [6, 18]. Given that the data are retrospective and self-reported, it is possible that mortality and morbidity are underreported. However, given the upcoming availability of the BOLD data we will be able to validate these results.

In conclusion, these hospitals' collective performance in unadjusted bariatric outcomes of readmissions, re-operations, and mortality are equivalent to or more favorable than previous reports by others in the field [6, 18]. This is the first report of ASMBS BSCOE data to date, and from this our BSCOE program has initiated comparable results to other reports in the literature. However, the data are hampered by the inability to relate mortality to operative procedure, as well as to numerous other issues, including age, sex, BMI, and comorbidities. These application data serve as a precursor to BOLD, which is a unique clinical platform for evidence-based medicine that will further track complications and improvement or resolution of comorbidities longitudinally, in real time, in an effort to develop risk stratification guidelines that promote improved patient care and outcomes. As such, we believe that, through the application of BOLD, ASMBS BSCOEs will establish an industry standard for optimum bariatric surgical therapies and care.

**Acknowledgements** The authors would like to thank all ASMBS BSCOE hospitals and surgeons that contributed to the data described

here. The authors would also like to gratefully acknowledge SRC's Research Advisory Committee, Drs. Harvey Sugerman, Bruce Wolfe, and Eric DeMaria for their helpful discussions, guidance, and review, as well as the ASMBS leadership and membership. Finally, we are especially grateful to Dr. Ruth Little of Epidemiology Services for her insightful comments and editing of this manuscript. This study was sponsored by Surgical Review Corporation.

**Conflicts of Interest** Mr. Pratt is the Chief Executive Officer of Surgical Review Corporation. Mr. Warthen is an employee of Surgical Review Corporation. Drs. Hughes and Learn were employees of Surgical Review Corporation at the time of this research. Dr. Pories is Chairman Emeritus of Surgical Review Corporation. Dr. Clark is a statistical consultant for SRC.

## References

- Pratt GM, McLees B, Pories WJ (2006) The ASBS Bariatric Surgery Centers of Excellence program: a blueprint for quality improvement. *Surg Obes Relat Dis* 2:497–503
- Bradley DW, Sharma BK (2006) Centers of Excellence in Bariatric Surgery: design, implementation, and one-year outcomes. *Surg Obes Relat Dis* 2:513–517
- Livingston EH (2007) Procedure, incidence and complication rates of bariatric surgery in the United States. *Arch Surg* 142: 919–922
- Bray GA (2007) The missing link—lose weight, live longer. *N Engl J Med* 357:818–820
- Dixon J (2006) Survival advantage with bariatric surgery: Report from the 10th International Congress on Obesity. *Surg Obes Relat Dis* 2:585–586
- Flum DR, Salem L, Elrod JAB, Dellinger EP, Cheadle A, Chan L (2005) Early mortality among Medicare beneficiaries undergoing bariatric surgical procedures. *JAMA* 294:1903–1908
- Shekelle PG, Morton SC, Maglione M, Suttrop M, Tu W, Li Z, Maggard M, Mojica WA, Shugarman L, Solomon V, Jungvig L, Newberry SJ, Mead D, Rhodes S (2004) Pharmacological and surgical treatment of obesity. Evidence Report/Technology Assessment No. 103 AHRQ Publication No. 04-E028-1(1530-440X):1–6
- Brethauer SA, Chand B, Schauer PR (2006) Bariatric surgery: part of the answer to the obesity epidemic. *Cleve Clin J Med* 73(11):993–1007
- Cefalu WT (2006) Bariatric surgery: part of the answer to the obesity epidemic. *Cleve Clin J Med* 73:969–970
- Anderson WA, Greene GW, Forse RA, Apovian CM, Istfan NW (2007) Weight loss and health outcomes in African Americans and Whites after gastric bypass surgery. *Obesity* 15(6): 1455–1463
- DeMaria EJ (2007) Bariatric surgery for morbid obesity. *N Engl J Med* 356(21):2176–2183
- Finkelstein EA, Ruhm CJ, Kosa KM (2005) Economic causes and consequences of obesity. *Annu Rev Public Health* 26:239–257
- Jamal MK, DeMaria EJ, Johnson JM, Carmody BJ, Wolfe LG, Kellum JM, Meador JG (2005) Impact of major co-morbidities on mortality and complications after gastric bypass. *Surg Obes Relat Dis* 1:511–516
- Dixon JB, O'Brien PE, Playfair J, Chapman L, Schachter L, Skinner S, Proietto J, Bailey M, Anderson M (2008) Adjustable gastric banding and conventional therapy for type 2 diabetes. *JAMA* 299:316–323
- Vogel JA, Franklin B, Zalesin K, Trivax J, Krause K, Chengelis D, McCullough P (2007) Bariatric surgery cuts CHD risk. *Am J Cardiol* 99:222–226
- Pories WJ (2006) Yes, Virginia, bariatric surgery works...and it is safe. *N C Med J* 67(4):296–300
- Sjostrom L, Narbro K, Sjöström CD, Karason K, Larsson B, Wedel H, Lystig T, Sullivan M, Bouchard C, Carlsson B, Bengtsson C, Dahlgren S, Gummesson A, Jacobson P, Karlsson J, Lindroos AK, Lönroth H, Näslund I, Olbers T, Stenlöf K, Torgerson T, Ågren G, Carlsson LM (2007) Effects of bariatric surgery on mortality in Swedish obese subjects. *N Engl J Med* 357:741–752
- Buckwald H, Avidor Y, Braunwald E, Jensen MD, Pories WJ, Fahrbach K, Schoelles K (2004) Bariatric surgery: a systematic review and meta-analysis. *JAMA* 292:1724–1737