

Trends in Bariatric Surgery for Morbid Obesity in Wisconsin: A 6-Year Follow-Up

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ABSTRACT

Background: The prevalence of morbid obesity is increasing throughout Wisconsin and the United States. In 2004, we published a study, "Trends in Bariatric Surgery for Morbid Obesity in Wisconsin." We determined that surgery rates were increasing but felt the demand exceeded the capacity of the surgeons. This is a 6-year follow-up.

Methods: Data was gathered from 3 sources: the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System, the Wisconsin Hospital Association, and a survey administered to Wisconsin bariatric surgeons.

Results: From 2003-2008, an average of 2.8% of Wisconsin adults were morbidly obese. Although the number of bariatric surgeries performed in Wisconsin remained steady (1311 surgeries in 2003 and 1343 in 2008), the types of procedures shifted from open gastric bypass (73% in 2003) to laparoscopic gastric bypass (80% in 2008). The rate of surgery was 1 for every 100 morbidly obese adults. The majority of surgeons surveyed (70%) report that a lack of insurance benefits is the biggest barrier to performing bariatric surgery.

Conclusion: The prevalence of morbid obesity continues to increase in Wisconsin compared to our previously published data. Bariatric surgery volumes have remained stable but the type of procedure has changed. Approximately 1% of bariatric surgery candidates have surgery each year.

INTRODUCTION

Obesity continues to be a national epidemic. The prevalence of obesity (Body Mass Index [BMI] ≥ 30 kg/m²) increased by 24% from 2000-2005, while the prevalence of morbid obesity (BMI ≥ 40) increased twice as fast.¹ Obesity affects many aspects of health with associated comorbidities including diabetes, hypertension, and sleep apnea.²⁻³ Studies have shown this leads to a reduced life expectancy in the obese population, especially younger adults.⁴ Furthermore, the health care dollars spent on treating the obese are in the billions and are projected to increase dramatically in the future.⁵

Many strategies are available to treat and prevent obesity including lifestyle modification, pharmacotherapy, and surgery. A review by Bray⁶ of weight loss through the use of lifestyle modification and pharmacotherapy revealed 10% excess weight loss in obese subjects. This limited weight loss is in contrast to a recent review of the bariatric literature that reveals a 26% excess body weight loss 1 year after bariatric surgery, with good preservation at 5 years.⁷ The Swedish Obese Subjects (SOS) study,⁸ a prospective, match-controlled study, also showed that bariatric surgery was superior to conventional methods for sustained weight loss and resolution of comorbidities. Bariatric surgery has become an increasingly acceptable form of treatment for morbid obesity. In 1991, the National Institute for Health established that patients with a BMI ≥ 40 or BMI ≥ 35 with high risk comorbidities as appropriate candidates for bariatric surgery.⁹ The American College of Surgeons and American Society for Metabolic and Bariatric Surgeons adhere to these guidelines when choosing appropriate candidates for surgery. Furthermore, the Centers for Medicare and Medicaid Services (CMS) has established payment for certain bariatric procedures under these guidelines as long as the patient has undergone unsuccessful weight loss treatment and the procedure is performed at a Medicare-approved facility.¹⁰ Since the advent of these guidelines, the total number of surgeries performed for weight loss has increased. Zhao

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reports an 804% increase in the number of bariatric procedures from 1998-2004.¹¹ Furthermore, although bariatric surgery is expensive up-front, recent data suggests that costs can be recouped in 2-4 years.¹²

The prevalence of obesity in Wisconsin increased from 21% in 2003 to 26% in 2008.¹³ In 2004, the authors of this manuscript published a study titled "Trends in Bariatric Surgery for Morbid Obesity in Wisconsin,"¹⁴ which evaluated the number of bariatric surgeries performed from 2001-2002 in Wisconsin relative to morbid obesity trends during the same time period. A survey of practicing bariatric surgeons was also conducted to assess the current practice and future trends as identified by those surgeons. At that time we found that approximately 80,000 adults were morbidly obese, and there was roughly 1 bariatric surgery for every 200 morbidly obese Wisconsin adults.¹⁴ The current study is a 6-year follow-up to the previous study.

METHODS

Data for this study were gathered from 3 sources and were similar to the previous study. First, the Wisconsin-specific prevalence of morbid obesity was estimated using publicly available data from the Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (BRFSS)¹³ and population estimates from the CDC Wide-ranging OnLine Data for Epidemiologic Research (WONDER) database.¹⁵ Second, the Wisconsin Hospital Association (WHA) provided data to examine the recent trends in bariatric surgeries performed in Wisconsin. Third, a survey was developed and administered to Wisconsin bariatric surgeons to assess their current bariatric surgery practices and predict future trends. All data analyses and statistical calculations were performed using SAS version 9.2 and Microsoft Excel software. Detailed information about our sources and methods is below.

The prevalence of morbid obesity (defined as BMI ≥ 40) was estimated using the Wisconsin BRFSS data from 2003-2008 as well as the census data for 2005 (the midpoint for the data set). BRFSS is a monthly telephone questionnaire designed by the CDC to gather data on behaviors that affect health.¹³ The BRFSS allows a large sample to calculate prevalence. For this study, the self-reported height and weight from BRFSS was used to calculate a BMI and establish a percentage of people surveyed with a BMI ≥ 40 . A BMI ≥ 40 was used as the focus of this study as well as the previous study because the National Institutes of Health (NIH) has designated patients with a BMI ≥ 40 or BMI ≥ 35 with comorbidities as appropriate candidates for

bariatric surgery.⁹ By applying the average percentage of people surveyed with a BMI ≥ 40 from 2003-2008 to the 2005 Wisconsin census data, an estimate of the population of Wisconsin with morbid obesity (ie, BMI ≥ 40) was determined. This was then stratified by age and gender.

The number of bariatric surgeries performed in Wisconsin from 2003-2008 was analyzed from WHA discharge data. WHA collects data from all hospitals in Wisconsin, except the Veterans Hospital. Data are collected on all inpatient and outpatient surgeries, including self-pay patients, and information is recorded related to principal diagnosis, procedure, age, sex, and other variables related to the medical record.¹⁶ For this study, bariatric surgery CPT codes or comparative ICD-9 diagnosis codes were used to generate data sets according to year, gender, and age range. WHA data from 2008 were only collected through the third quarter; therefore, all the results were multiplied by 1.33 to produce a representative sample for the entire year. The CPT codes used for this study were 43846 open gastric bypass (OGB) with roux limb 150 cm or less, 43644 laparoscopic gastric bypass (LGB) with roux limb 150 cm or less, 43842 vertical-banded gastroplasty (VBG), and 43770 laparoscopic adjustable gastric band (LAB). Using the number of bariatric surgeries performed and the estimated populations with BMI ≥ 40 , rates of surgery were calculated for the population of morbidly obese.

Finally, the study involved a 24-question survey mailed to 49 bariatric surgeons practicing in Wisconsin in summer 2009. Surgeons were identified through the Association for Morbid Obesity Support Group at www.obesityhelp.com. This website provides the most complete list of bariatric surgeons practicing in Wisconsin and was also used in the previous study.

RESULTS

Prevalence of Morbid Obesity in Wisconsin 2003-2008

The rates of morbid obesity in Wisconsin during 2003-2008 are presented in Table 1. During 2003-2008, an average of 2.8% of Wisconsin adults were morbidly obese (95% confidence interval [CI]: 2.6%-3.0%), with morbid obesity rates increasing from 2.2% in 2003 to 3.4% in 2008. Rates of morbid obesity were higher among women (3.4%; 95% CI: 3.1%-3.6%) compared to men (2.3%; 95% CI: 2.0%-2.5%). The rate of morbid obesity increased with age during 2003-2008, with the peak at ages 55-64 for both genders (Figure 1). After the age of 65, the rate of morbid obesity drops and resembles that of the 18- to 34-year-old age group.

Table 1. Morbid Obesity and Bariatric Surgery Rates in Wisconsin

Age	BRFSS 2003-2008 (Average of all years)		Estimated Population BMI >40 ^a	WHA Discharge Data 2003-2008 (Average of all years)	
	No. People Surveyed	% Surveyed with BMI >40 ^a		No. Surgeries	Procedures/Population BMI >40 ^{ab}
Males					
18-34	2522	1.9% (1.3%-2.4%)	12,000 (8,600-15,400)	33	28 (21-38)
35-54	6051	2.2% (1.8%-2.6%)	18,600 (15,500-21,700)	126	68 (58-82)
55-64	2791	3.7% (3.0%-4.4%)	10,600 (8,600-12,600)	41	39 (33-48)
65+	3240	1.9% (1.4%-2.3%)	5,700 (4,200-7,100)	11	20 (16-26)
Total	14,604	2.3% (2.0%-2.5%)	46,853	211	45 (40-50)
Females					
18-34	3520	2.9% (2.4%-3.5%)	17,900 (14,500-21,300)	247	138 (116-171)
35-54	7814	3.8% (3.4%-4.3%)	31,700 (28,200-35,200)	621	196 (176-220)
55-64	3562	4.8% (4.1%-5.5%)	13,800 (11,800-15,800)	145	105 (92-123)
≥65	5358	2.2% (1.8%-2.6%)	9,000 (7,400-10,600)	29	32 (27-39)
Total	20,254	3.4% (3.1-3.6%)	72,279 (66,955-77,602)	1042	144 (134-156)
Total Both Genders	34,858	2.8% (2.6%-3.0%)	118,560 (111,249-125,871)	1253	106 (100-113)

^a 95% Confidence Interval

^b Per 10,000

Abbreviations: BRFSS, Behavioral Risk Surveillance System; WHA, Wisconsin Hospital Association.

Trends in Bariatric Surgery in Wisconsin

According to the WHA database, except for 2004, the total number of bariatric surgeries performed in Wisconsin has remained fairly steady, with 1311 surgeries performed in 2003 and 1343 performed in 2008. However, the type of surgery performed changed dramatically, as shown in Figure 2. In 2003 and 2004, the majority of bariatric surgeries performed were open gastric bypasses (73% and 42% respectively.) By 2005, laparoscopic gastric bypass was clearly the most common surgery, with an average of 80% of all surgeries performed by this method from 2005-2008. Also, in the 2005-2008 time period, the number of open gastric bypasses declined dramatically, with only 3 performed in 2008. Furthermore, there was a steady increase in the number of laparoscopic adjustable bands (1% of surgeries in 2004 and 25% in 2008). Finally, vertical banded gastroplasties consisted of more than 26% of surgeries in 2003-2004, and then declined in 2005 to remain at approximately 3%.

The majority of bariatric surgeries performed during

2003-2008 were on patients aged 35-54. Less than 1% of all bariatric surgeries were performed among adolescents ages 13-17 and only 3% were among those aged ≥65. Rates of gastric bypass per 10,000 morbidly obese are represented in Table 1. Morbidly obese women were more likely to have bariatric surgery than men in all age categories, with an average of 83% of bariatric surgeries performed on women. Overall, approximately 1 of 100 morbidly obese adults had bariatric surgery in Wisconsin.

Survey Results

Forty-nine practicing bariatric surgeons were identified in Wisconsin. After initial and follow-up mailings, a total of 20 surveys were returned, for a yield of 41%. Responses are summarized in Table 2. The average number of years of bariatric practice was 11.3, with a median of 7.5 (range 1.5-37 years). Comparing 2007 to 2008, 55% of surgeons increased the number of bariatric surgeries they performed. Most of the surgeons (55%)

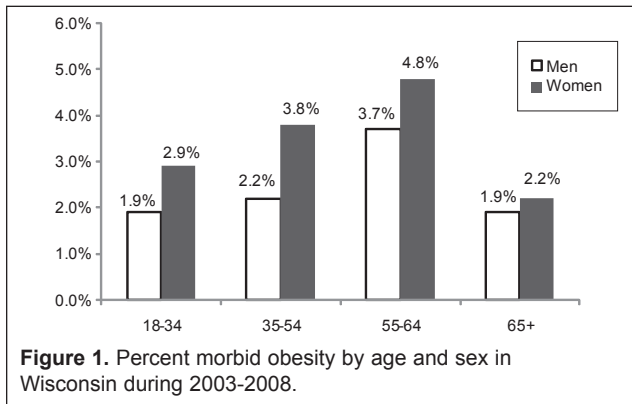


Figure 1. Percent morbid obesity by age and sex in Wisconsin during 2003-2008.

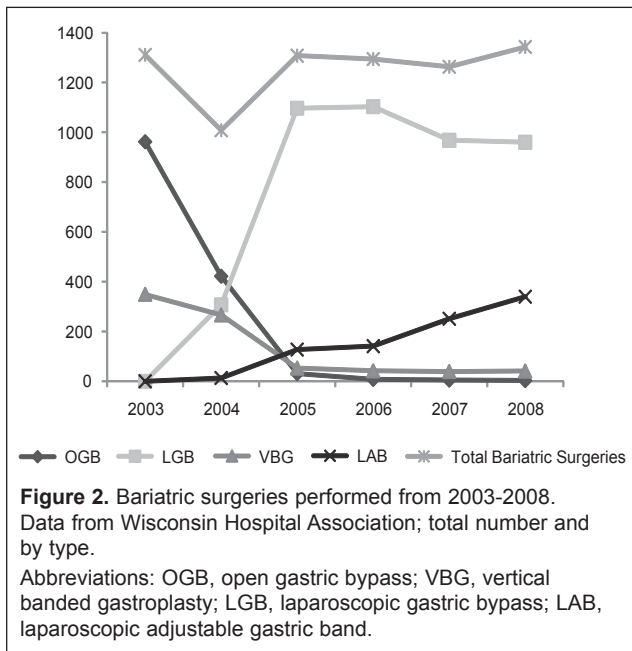


Figure 2. Bariatric surgeries performed from 2003-2008. Data from Wisconsin Hospital Association; total number and by type. Abbreviations: OGB, open gastric bypass; VBG, vertical banded gastroplasty; LGB, laparoscopic gastric bypass; LAB, laparoscopic adjustable gastric band.

predict an increase in the number of bariatric surgeries they will perform in 2009, with 73% of those surgeons predicting a <25% increase in their practice.

In 2008, the set of surgeons returning the survey reported performing 1486 bariatric surgeries. The types of surgeries reported were 64% laparoscopic gastric bypass, 14% open gastric bypass, 17% laparoscopic adjustable bands, and 5% other procedures including gastric sleeve, biliopancreatic diversion, and revision.

In the next 12 months, 25% of surgeons plan to add another bariatric surgeon to their practice and 85% plan to continue practicing bariatric surgery. Only 50% of responding surgeons have a practice certified as a Center of Excellence by the American College of Surgeons or American Society of Bariatric and Metabolic Surgery. To be certified as a Center of Excellence, a bariatric program must meet 10 requirements and complete a full review process.¹⁷ Of those surgeons not certified, 80% acknowledge not having enough cases as the reason for

not being certified. On the other hand, 95% of respondents offer a comprehensive weight-management program in addition to surgery.

The most common motivating factor (95% response) to perform bariatric surgery was personal interest. The majority of surgeons obtained their bariatric training through courses (75%) and residency (65%).

Most bariatric surgeons (70%) pinpointed a lack of insurance approval for surgery as the biggest barrier. Surgeons reported wide variability in the percentage of “eligible candidates” for surgery who have an insurance plan that would cover a bariatric procedure. This ranged from 7 of 19 surgeons who reported that nearly all (90%) eligible candidates have insurance benefits to 5 of 19 who reported that <50% of eligible candidates have insurance plans that provide bariatric surgery benefits. In addition, the majority of surgeons (19 of 20) report turning away <10% of patients who would otherwise be candidates (morbidly obese) due to medical or psychiatric conditions.

DISCUSSION

We estimate there are approximately 120,000 adults with morbid obesity in Wisconsin today, an increase of 50% over the past decade.¹⁴ Together with those with a BMI of 35-40 and a coexisting comorbidity, these individuals qualify for bariatric surgery. This finding reflects other studies on trends in morbid obesity in this country and confirms that morbid obesity is a fast-growing epidemic.¹ Rates of morbid obesity continue to be higher among women compared to men. Our data show that morbid obesity now peaks at the ages of 55-64 for both genders, which differs from the previous study, which showed a peak prevalence of morbid obesity in the 35-54 age group for both genders.¹⁴ This may mark a trend in morbid obesity with its associated health problems in the aging population.

Currently, there are 49 bariatric surgeons in Wisconsin who are listed on obesityhelp.com. According to our survey results, 55% of the surgeons predict an increase in their practice, yet the majority of those surgeons (74%) predict only a small (<25%) increase. If all eligible candidates could have bariatric surgery, each surgeon would have to perform more than 2400 surgeries. This is an unlikely goal considering the number of bariatric surgeries performed over the last 6 years has stayed relatively stable. It’s likely that if eligible patients had access to insurance benefits for this procedure, the number of surgeries would increase dramatically.

Analyzing the WHA database for Wisconsin surgeries, there were 963 gastric bypasses performed in 2008

compared to only 182 gastric bypasses in 2001.¹⁴ This is more than a 5-fold increase in the number of gastric bypasses alone. Over the last several years, gastric bypass has become the standard in bariatric surgery. The SOS study concluded that while all bariatric procedures promote modest weight loss at 1 year, gastric bypass was the best, with 38% weight change compared to 26% and 21% for VBG and LAB, respectively.⁸ Furthermore, a meta-analysis by Buchwald¹⁸ of bariatric surgery reveals gastric bypass to be more effective for resolution of diabetes compared to VBG and LAB. These findings may guide bariatric surgeons to perform more gastric bypass rather than other types of surgeries.

Although the total number of bariatric surgeries stayed relatively stable between 2003 and 2008 (except for a decline in 2004 due to unidentified factors), the types of bariatric surgeries performed changed dramatically. First, OGB was the most common type of bariatric surgery in 2003, with 962 performed, but by 2008, only 3 were recorded. Recent prospective studies comparing OGB versus LGB have shown, even in the face of a steeper learning curve, that LGB was the preferable method due to fewer short-term post-operative complications¹⁹⁻²⁰ and abdominal wall hernias.²⁰ This may be 1 explanation for the trend. Another possible explanation is that the code for LGB was not established until 2004. It is possible that the majority of bypasses performed prior to this were done laparoscopically but not reflected in CPT coding. Second, LAB became more common after 2003, with a 26-fold increase by 2008. Possible explanations for the lack of LAB use before 2003 are its FDA approval in 2001, time needed for surgeon training, and acquisition of proper codes for the procedure. The LAB is attractive to many patients because it is less invasive and easier to reverse compared to other bariatric procedures. However, this procedure has been shown to have more long-term complications and less weight loss at 1 year than gastric bypass.⁷ This may limit the numbers of this procedure being performed in the future. Finally, the number of VBGs declined in 2005 and remained at around 3% of all surgeries throughout 2008. Interestingly, the surgeons did not report any VBG but did note gastric sleeve and biliopancreatic diversion surgery. These other bariatric surgeries should be considered for study in the future.

Compared to the WHA data, our survey data shows some discrepancy in the number of bariatric surgeries performed. According to the WHA data, 1343 surgeries were performed in 2008, while surgeons reported 1486. Considering only 41% of physicians returned the survey, this difference could be much larger. Furthermore,

Table 2. Survey Results from Bariatric Surgeons, N=20	
Years Practicing Bariatric Surgery in Wisconsin	
Average	11.3
Median	7.5
Range	1.5-37
Type of Bariatric Surgeries Performed in 2008	
Laparoscopic gastric bypass	64% (n=915)
Open gastric bypass	14% (n=205)
Gastric band	17% (n=241)
Other	5% (n=68)
Number of Bariatric Surgeries (2008 Compared to 2009 Estimates)	
Predict increase	55%
Predict decrease	20%
Predict no change	25%
Plan to Add Another Bariatric Surgeon to Group in Next 12 Months	
Yes	25%
No	75%
Motivating Factors to Provide Bariatric Surgery (Multiple Responses Allowed)	
Personal interest	95%
Consumer need	80%
Practice/group need	65%
Desire to use advanced technology	35%
Financial reasons	5%
Other	5%
Biggest Barrier to Performing Bariatric Surgery	
Insurance approval	70%
Competing professional obligations	20%
Other	10%

in 2008, surgeons reported 14% of their procedures to be OGB while WHA recorded around 0.2% of the procedures to be OGB. Reasons for this discrepancy could include over-reporting by surgeons, use of different codes, or coding as secondary procedures, which was not analyzed by WHA data. Furthermore, the surveys may report surgeries that were performed by an assistant surgeon and actually duplicate the primary surgeon's response and falsely elevate the number of self-reported bariatric surgeries in the state. Therefore, the survey data cannot be analyzed as objectively as the WHA numbers.

This study reveals that women were more likely to have bariatric surgery than men, similar to our previous findings of around 80%-85%. This study revealed the majority of bariatric surgeries performed during 2003-2008 were on patients aged 35-54, which was no different from our previous study.¹⁴ Adolescents ages 13-17 were found to make up less than 1% of all bariatric surgeries performed. Schilling et al²¹ reported that most hospitals

performing bariatric operations on adolescents did less than 4 bariatric procedures annually on this age group. Our data shows that throughout Wisconsin, only ≤ 2 bariatric procedures are performed on adolescents each year. Another age group analyzed for this study was the elderly, age ≥ 65 , which made up approximately 3% of all surgeries. Evidence suggests that while bariatric surgery in the elderly (>60 years of age) is associated with higher morbidity and in-hospital mortality, the procedure is safe in properly selected individuals.²²

During 2003-2008, morbid obesity was more prevalent among females of all age groups, although compared to the 1999-2001 data, morbid obesity increased more rapidly in males. We previously reported twice as many morbidly obese females than males,¹⁴ though our new data shows only 1.5 times as many morbidly obese females as males (Table 1). The rate of bariatric surgery in morbidly obese women was greater than men in all age categories, as was the case in our previous study.¹⁴ Finally, although the rate of bariatric surgery nearly doubled in the morbidly obese across all ages and genders since 2002, the current rate only treats 1 out of 100 morbidly obese adults in Wisconsin.

There are several limitations to our study. First, the data reported here may under-represent the true prevalence of morbid obesity. Self-reported height and weight from the BRFSS database was used to calculate BMI. There is a tendency to under-report weight and over-report height,²³⁻²⁴ which will result in a lower prevalence than if height and weight were otherwise measured. Second is the uncertainty related to the number of open versus laparoscopic gastric bypasses performed prior to 2004 due to the lack of separate codes for these procedures. Also, only 4 bariatric codes were analyzed, and the data does not reflect every type of bariatric surgery performed in Wisconsin. A limitation of comparing our results to our previous data is the previous study only looked at gastric bypass while our data looks at several types of bariatric surgeries. Some analogies can be made, however, since gastric bypass was the most common surgery performed during 2003-2008. Finally, there was only a 41% return rate for our survey, leaving a small surgeon sample size as well as questions of over-reporting of surgeries to make generalizations from the data collected.

CONCLUSION

Our findings indicate a continuing increase in the prevalence of morbid obesity in Wisconsin. While not the entire solution to the obesity epidemic, bariatric surgery is an important option to make readily available to patients struggling to control their weight and

associated health conditions. Since 2002, Wisconsin has seen an increase in the number of bariatric procedures performed, and the surgeries have shifted from OGB to LGB. Although the rate of bariatric surgeries relative to Wisconsin's morbidly obese population has doubled since our previous study, only 1% of surgical candidates are having bariatric surgery each year. With barriers to surgery such as insurance approval, it's likely the needs of this population are not being met.

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