Trends in Bariatric Surgery for Morbid Obesity in Wisconsin

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ASTRACT

Background: Obesity is a national epidemic with rates in Wisconsin and the U.S. doubling over the past decade. Research of available treatments for *morbid* obesity (body mass index = 40 kg/m^2) suggests that bariatric surgery may be the only modality that provides any significant long term weight loss.

Methods: Using the data from Center for Disease Control's Behavioral Risk Factor Surveillance System, we analyzed self-reported information on body weight and height among adults in Wisconsin. We used the WITHIN database for inpatient hospitalization and surgeries in Wisconsin to evaluate trends in gastric bypass surgery. Finally, we surveyed bariatric surgeons in Wisconsin to assess trends in bariatric surgery in the state.

Results: In Wisconsin, the percentage of the adults considered to be obese increased from 11% in 1990 to 22% in 2001. In 1999-2001, approximately 80,000 adults (2% of the population) were morbidly obese. The number of gastric bypass surgeries performed in Wisconsin more than doubled in one year, from 182 in 2001 to 426 in 2002. According to bariatric surgeons, gastric bypass accounts for approximately 90% of bariatric surgeries performed in Wisconsin. Thus, in 2002, there was roughly one bariatric surgery for every 200 morbidly obese Wisconsin adults. Most (84%) bariatric surgeons are planning to increase the number of procedures they perform and 24% plan on adding an additional bariatric surgeon to their group.

Summary: Bariatric surgery rates are increasing in Wisconsin, yet the demand for surgery far exceeds current capacity of surgeons in the state.

INTRODUCTION

The headlines are no longer new—obesity is now considered a national epidemic. Furthermore, the percentage of overweight or obese adults continues to climb each year. In 1990, 36% of the Wisconsin adults were overweight and an additional 11% were obese.[1] This contrasts sharply with data from 2001: the percentage of overweight adults had risen to 37%, with the prevalence of obesity doubling to 22%. Wisconsin is not alone in its obesity problem. In 1991, only 4 states had obesity rates greater than 15% but by 2000, all states but Colorado had obesity rates in excess of 15%.[2]

Obesity can be linked with a number of medical problems including hypertension, hyperlipidemia, diabetes, coronary heart disease, congestive heart failure, stroke, sleep apnea,, gallstones, osteoarthritis, colon cancer, breast cancer, and endometrial cancer. Each year in the United States, approximately 300,000 die from obesity related complications.[2]

It is estimated that the cost of treating obesity is between 5% and 9% of all national healthcare expenditures, making the dollar cost of treating obesity approximately $77 to 98 billion per year.[2,2,4] Wisconsin's portion of the treatment is approximately $1.4 billion per year.[1] One study, published in 2001, found the cost for providing health care to an overweight individual to be 10% higher than those of normal BMI and 36% higher for an obese individual.[4] Surely, reducing obesity prevalence will help decrease the State's health care burden.

There are many programs available to aid obese people in losing weight. In fact, it is estimated that $30 billion dollars are spent yearly on weight reduction methods.[5] However, a systematic

review of literature regarding the treatment of obesity found that few conservative methods, including diet, exercise, medications, and behavioral therapy, actually resulted in long term weight loss, defined as loss maintained longer than 12 months. Five years later, nearly 100% of the people had gained back all of the weight they originally lost through conservative measures.[5,6] Due to the limited success of diets and pharmacotherapy, a great deal of uncertainty surrounds effective programs for the treatment of obesity.

Health problems are even more severe in the morbidly obese, defined as a BMI = 40[7]. For a woman whose height is 5'6", a weight of 250 pounds would yield a BMI of 40; a 5'11" man with that same BMI would weigh about 290 pounds. In addition to suffering from a myriad of health conditions and psychosocial problems, a morbidly obese person has only a 1 in 7 chance of reaching his or her normal life expectancy.[8] Conservative treatment options for the morbidly obese are consistently unsuccessful.[9] However, recently evolving evidence suggests that gastric surgery is quite effective in both short and long term weight loss for the morbidly obese patient.[10] A Swedish study involved a prospective matched cohort study of 2000 morbidly obese patients treated with medications with 2000 morbidly obese patients treated with surgery. The study found that bariatric surgery was better at weight reduction and improvement in the co-morbidities associated with obesity.[8] In addition to the success bariatric surgery offers in terms of weight loss, an analysis of adult men and women with a BMI of 40-50 found gastric bypass to be cost-effective compared to no treatment.[11] Furthermore, obesity-related co-morbid medical conditions may remit following bariatric surgery. In the Balsiger et al. study[10], in addition to weight loss due to bariatric surgery there was a decrease in usage of antihypertensives

medications from 36% to 18%, insulin from 12% to 1%, and need of anti-inflammatory medicine from 33% to 9%.

This study had three related objectives. First, we analyzed rates of morbid obesity in Wisconsin by utilizing the Center for Disease Control's (CDC) Behavioral Risk Factor Surveillance System (BRFSS). We also evaluated recent trends in bariatric surgery in Wisconsin through the hospital discharge database. Finally, using a survey of bariatric surgeons in the state, we collected clinical impressions of expected trends in bariatric surgery in the near future.

METHODS

Data for this report were gathered from three sources. First, Wisconsin-specific prevalence of obesity and morbid obesity were assessed using publicly available data from the CDC's BRFSS at www.cdc.gov/brfss.[12] Second, the State of Wisconsin, Department of Health and Family Service's WITHIN database, which is also publicly available at www.dhfs.state.wi.us/healthcareinfo/qsmain.htm, was used to examine recent trends in bariatric surgery. Third, we developed and administered a survey of Wisconsin bariatric surgeons to assess current bariatric surgery practices as well as attempt to estimate future trends. These sources and associated analyses are detailed below.

To determine the prevalence of morbid obesity in Wisconsin we analyzed BRFSS data for the three year period from 1999 to 2001, since rates are unlikely to change over this time period, and the estimates are more stable because of the larger sample sizes.[12] The BRFSS is a monthly telephone questionnaire developed by the CDC to gather data on behaviors that affect health.

For our study, we used self- reported heights and weights from the Wisconsin BRFSS data to calculate a body mass index (BMI, weight in kg/height^2 in m^2). These calculated BMI's were divided into groups and analyzed by age and gender. The International Federation for the Surgery of Obesity has set selection criteria to follow for obesity surgery. The criteria state that bariatric surgery is indicated if a patient has either a BMI = 40 or a BMI between 35 and 40 and presenting with a serious co-morbid condition.[8] We chose to focus on those adults with a BMI = 40, since this is a sufficient indication for bariatric surgery. We multiplied prevalence data for 1999-2001 by census estimates for age and gender to estimate the number of adults with morbid obesity.

Next we analyzed the WITHIN database for the years 2001 and 2002. The WITHIN database is a comprehensive data set, cataloging all the hospitalizations and outpatient surgeries taking place in Wisconsin hospitals. All Wisconsin hospitals are required to submit data on a quarterly basis and the database is driven by the patient's discharge date. In that case, the data base contains all records from all hospitals that discharged patients in 2001 and 2002. Veteran's hospitals are excluded from the reporting requirement. Principal diagnostic and procedure codes (ICD-9 criteria) can be analyzed by sex, age, county of residence, primary payer, year of discharge, total charges, and mean charges. Bariatric surgeries are recorded under two separate ICD-9 codes: gastric bypass (code 44.31) and insertion of a gastric bubble (code 44.93). Both open and laparoscopic gastric bypass are coded under 44.31 and thus we could not analyze them separately from this data set.

An additional limitation of the WITHIN data set was that all of the other forms of bariatric surgery, such as vertical banded gastroplasty, duodenal switch, and adjustable gastric banding, are lumped with other stomach and intestinal surgeries and coded under a variety of "other" ICD-9 codes. For example, vertical banded gastroplasty is coded under 44.69 for "other repair of the stomach". However, this other code is used for "other repair of stomach, inversion of gastric diverticulum, and repair of stomach not otherwise specified" and thus it is impossible to separate out those procedures coded 44.69 done as a treatment for obesity. Similar problems were encountered with other types of bariatric surgery. Based on these restrictions the WITHIN data base could only accurately classify gastric bypass. We calculated rates of surgery in two ways: per person in the state (census) and per person with morbid obesity.

The final element of our research involved a nine question survey mailed to 34 bariatric surgeons practicing in Wisconsin in late summer, 2003. Surgeons were identified through a list compiled by the Association for Morbid Obesity Support Group. This list was their most current and complete list of practicing bariatric surgeons in Wisconsin. The survey was returned by 25 (74%) of the surgeons.

For the analyses of all the data sources (BRFSS, WITHIN, mailed survey), descriptive statistics, were calculated with SAS and Microsoft Excel software. Graphics were produced with Microsoft Excel. The protocol was approved by the UW Medical School Institutional Review Board.

Results

Prevalence of morbid obesity in Wisconsin 1999-2001

The rates of morbid obesity during 1999-2001 are presented in table 1. During this time period, approximately 2% (95% confidence interval: 1.7 % to 2.3%) of Wisconsin adults are morbidly obese. This percentage represents approximately 79,000 adults (95% confidence interval: 67,000 to 91,000 adults). Rates of morbid obesity are higher among women (2.6%, 95% confidence interval: 2.2%, 3.1%), compared with 1.4% of men (95% confidence interval: 1.0%, 1.8% and 19,000 to 34000 adults) . Rates of morbid obesity also increase with increasing age, from 1.9% in females 18-34 to 2.9% in females 55+. Among men a different trend is seen with a peak prevalence of obesity in the age 35-54 (1.7%) (figure 2).

Trends in gastric bypass surgery in Wisconsin

Based on the WITHIN database, there were 182 gastric bypass surgeries performed in 2001 and 426 in 2002. The number of gastric bubble surgeries was in 0 in 2001 and 2 in 2002. Due to the very low number of gastric bubble procedures, no further analysis was done on this procedure. Patients aged of 25-54 accounted for 86% of the gastric bypass surgeries in 2001 and 85% of the cases in 2002. Individual age group break downs are shown in Figure 3. Women were more likely to have gastric bypass surgery, with over 85% of surgeries in 2001 and 87% of those in 2002 being performed on women.

Rates of gastric bypass surgery per 10,000 population and rates of gastric bypass surgery per 10,000 morbidly obese were greater among females in all age categories. For males 35-54, there were 28 bariatric surgeries per 10,000 morbidly obese. However for females 35-54, 93 bariatric surgeries were performed per 10,000 morbidly obese (Table 2). A morbidly obese female is more likely to have bariatric surgery than a morbidly obese male. Females age 18-34 are 7 times

more likely, females age 35-54 are 3 times more likely, and those 55+ are 1.3 times more likely to undergo bariatric surgery than their age matched, morbidly obese male counterparts.

Survey results

A total of 25 surveys out of 34 were returned for a yield of 74%. The average number of years the surgeon had been practicing bariatric surgery in Wisconsin was 7.6, with a median of 3, (range: 1 to 31 years). Comparing 2001 to 2002, 84% of surgeons practicing bariatric surgery during this time period increased the number of bariatric surgeries they performed, with 50% of surgeons at least doubling the number of bariatric surgeries they performed in this one year time frame. Most (83%) surgeons predict that the number of bariatric surgeries they perform will increase by 2003, compared to 2002 and 53% predict at least double the number of bariatric surgeries they performed. If the surgeon's practice was solely bariatric surgery, the approximate number of surgeries he or she could perform in the next 12 months ranged from 50 to 7500 with an average of 750. With regards to types of bariatric surgeries, 44% of surgeons state that almost all (90% or more) of their bariatric cases are open gastric bypass and 36% state that almost all (90% or more) of their bariatric cases are laparoscopic gastric bypass.

In 2002, a total of 1,239 bariatric surgeries were reported by surgeons returning the survey. The break down of specific type of surgery was 563 laparoscopic gastric bypass (45%), 596 open gastric bypass (51%), 11 vertical banded gastroplasty (<1%), and 68 other surgeries (5%).

In the next 12 months, 24% of the surgeons plan to add another surgeon who practices bariatric surgery to their groups and 20% were unsure. Factors that motivated surgeons to perform

bariatric surgeries included (more than one answer was allowed), personal interest (88%), consumer need (68%), practice/group need (20%), desire to use advanced technology (40%), and financial reasons (16%). Circumstances under which surgeons received training in bariatric surgery varied (more than one answer was allowed): during residency (60%), apprenticeship (16%), fellowship (8%), and courses (56%).

The bariatric surgeons surveyed estimated the demand for bariatric surgery in their communities in the next 12 months ranged from 50 patients to unlimited. Major barriers to performing bariatric surgery included: difficultly obtaining insurance approval (36%), competing professional obligations (36%), and limited operating room (OR) time (16%).

DISCUSSION

There are approximately 79,000 Wisconsin adults who, based only on BMI-criteria (BMI = 40) alone, might be candidates for bariatric surgery. There is an unknown number of additional state adults who may qualify based on having a BMI between 35-40 with the presence of a serious co-morbid condition. Currently, we know of thirty-four surgeons in Wisconsin providing bariatric surgery procedures. Based on the results of our survey, over 80% of surgeons are planning to increase the number of bariatric surgeries they perform in the next year and 53% are planning to more than double the number of surgeries. However, each surgeon would need to perform over 2000 bariatric surgeries to surgically treat the current level of morbid obesity in Wisconsin. Only 24% of surgeons plan to add another surgeon to their group.

Utilizing the WITHIN database for Wisconsin hospitalizations, there were 426 gastric bypass surgeries done in 2002. There is some discrepancy regarding the number of gastric bypass surgeries between the WITHIN databases (426) and the survey-reported gastric bypass surgery numbers (1159) for 2002. Considering the return rate of the surveys (74%), the difference between the sources may even be larger. Possible reasons for the disparity include surgeries performed at Wisconsin VA hospitals which are not reported to WITHIN or error in reporting on the behalf of the surgeons. Additionally, the publicly available WITHIN data can only be analyzed by primary procedure code and thus does not include gastric bypass surgeries done as a secondary procedure for that hospitalization. Another limitation of the WITHIN database for hospital procedures is that it can only provide data specific to gastric bypass surgeries. Based on our surgeon survey, gastric bypass accounts for over 90% of all bariatric surgeries, which can provide a rough estimate for the total number of bariatric surgeries in 2002. In 2002, there were approximately 450-1300 total bariatric surgeries performed in Wisconsin, representing one surgery for every 80-180 adult in the state with morbid obesity.

Morbid obesity is more prevalent among females in all age groups. Overall, there are nearly twice as many morbidly obese females than males (Table 1). In 2002, 7 out of 8 of gastric bypass surgeries were performed on females. The rates of procedures per population with a BMI = 40 were higher for females of all age groups (Table 2). One possible reason for the increased rate of surgery for eligible females (BMI = 40) could include a greater demand from females. Additionally it may be that, among persons who are morbidly obese, women tend to have even more extreme BMIs than men, and this could influence position on the surgery priority list. This

study only analyzed BMI = 40 and does not provide any information regarding the estimated populations with a BMI = 50 or 60.

Surgery for morbid obesity is increasing dramatically in Wisconsin. Confronting the public health problem of morbid obesity requires a comprehensive approach, from preventing obesity to treating those already afflicted. At present, bariatric surgery may be the only modality we can offer that provides any significant long term weight loss to the morbidly obese. The potential demand for surgery far exceeds the current capacity of surgeons in the state. However, there are a number of barriers to offering bariatric surgery to all morbidly obese Wisconsin residents. These include the lack of available funding and the limited number of bariatric surgeons in the state.

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Table 1. Gastric Bypass Surgeries in Wisconsin-2002

		BRFSS 1999-2001			WITHIN Hospital Discharge Data		
		Number of People Surveyed	**% Surveyed with BMI= 40** (95% confidence interval)	**Estimated Population BMI= 40** (95% confidence interval)	**Number of surgeries**	**Rate 1= Procedures / Total Pop** (per 10,000)	**Rate 2= Procedures / Pop BMI= 40** (per 10,000)
Males	***Age 18-34***	1037	1.2% (0.5%-1.8%)	7,000 (3,100-11,000)	12	2.0	17
	Age 35-54	1706	1.7% (1.1%-2.3%)	13,000 (8,400-17,700)	36	4.8	28
	Age 55+	985	1.2% (0.5%-1.8%)	6,100 (2,600-9,600)	8	1.5	13
Females	***Age 18-34***	1185	1.9% (1.1%-2.6%)	10,600 (6,200-15,000)	128	22	120
	Age 35-54	1879	3.0% (2.2%-3.7%)	21,600 (16,000-27,200)	201	28	93
	Age 55+	1408	2.9% (2.0%-3.8%)	18,400 (12,900-24,000)	41	6.5	22

Table 2: Results from Survey of Wisconsin Bariatric Surgeons (N=25)

Years Practicing Bariatric Surgery in Wisconsin	
Average	7.6
Median	3
Range	1-31
Number of bariatric surgeries 2001-2002	
Increased	84%
Increase by more than double	50%
Number of bariatric surgeries 2002 compared to 2003 estimates	
Predict increase	83%
Predict increase by more than double	53%
Max number of bariatric surgeries could be preformed per year	
Average	750
Range	50-7500
Type of bariatric surgery performed	
Laparoscopic gastric bypass	45% (n=563)
Open gastric bypass	48% (n=596)
Vertical Banded Gastroplasty	>1% (n=11)
Other	7% (n=68)
Plan to add another surgeon to their group in the next 12 months	
Yes	24%
Not sure	18%
Motivating Factors to provide bariatric surgery	
Personal Interest	88%
Consumer Need	68%
Practice/group need	20%
Desire to use advanced technology	40%
Financial Reasons	16%
Where bariatric surgeons received their training	
Residency	60%
Fellowship	8%
Apprenticeship	16%
Course	56%
Biggest barrier to performing bariatric surgery	
Insurance approval	36%
Competing professional obligations	36%
Limited OR time	16%
Other	12%
Barrier to performing bariatric Surgery	
Insurance approval	56%
Competing professional obligations	60%
Limited OR time	28%

Figure 1. Weight Status of Wisconsin Residents 1999-2001. Data from the CDC BRFSS.

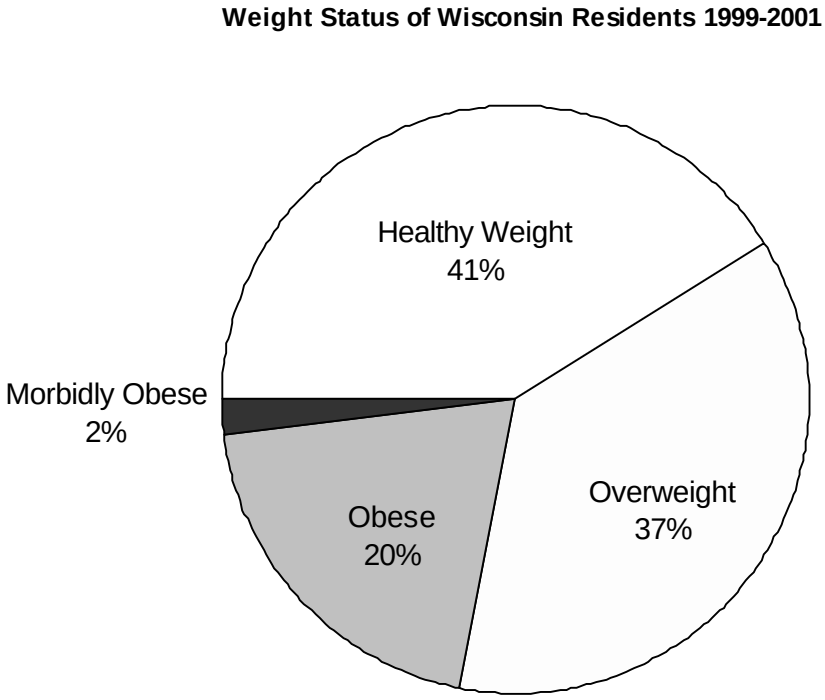

Figure 2. Prevalence of BMI = 40 kg/m^2 by age and sex --Wisconsin 1999-2001. Data from the CDC BRFSS.

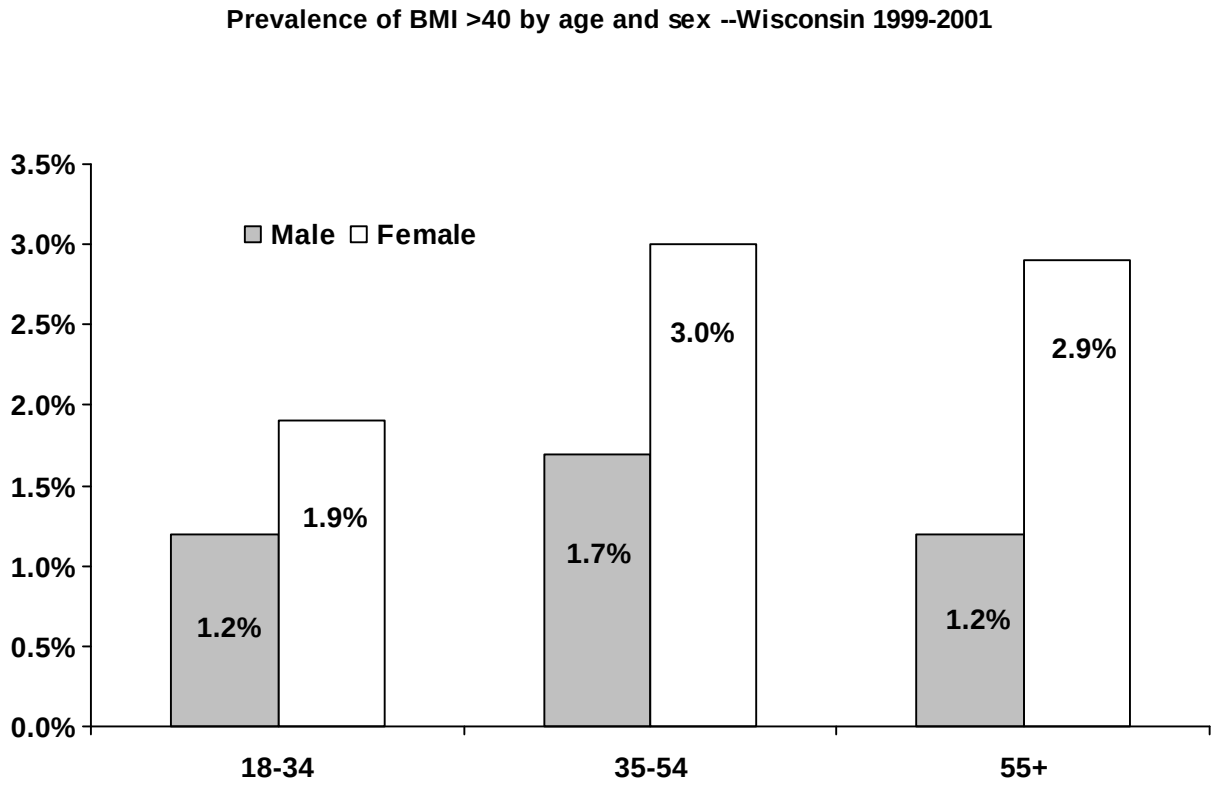

Figure 3. Gastric Bypass Surgeries in Wisconsin by Age and Gender 2002. Data from the WITHIN Database.

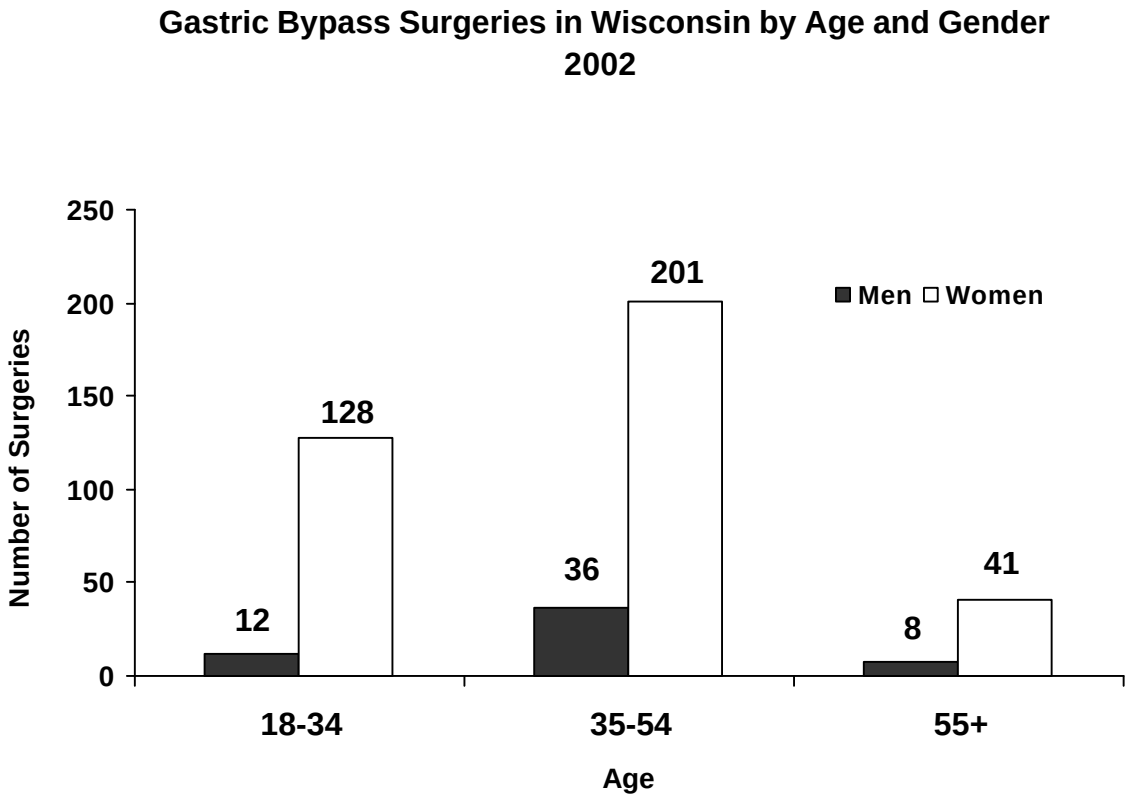

Figure 4. Gastric Bypass in Wisconsin by Age and Year. Data from the WITHIN Database.