




Introducing a Bariatric Surgery Program at a Large Urban Safety Net Medical Center Serving a Primarily Hispanic Patient Population

Taylor J. James¹  · Stephen F. Sener¹ · James D. Nguyen¹ · Marc Rothschild¹ · Lauren Hawley¹ · Tanu A. Patel¹ · Rachel Sargent¹ · Adrian Dobrowolsky¹

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Abstract

Background Few bariatric surgery programs exist at safety net hospitals which often serve patients of diverse racial and socioeconomic backgrounds. A bariatric surgery program was developed at a large urban safety net medical center serving a primarily Hispanic population. The purpose of this study was to evaluate safety, feasibility, and first-year outcomes to pave the way for other safety net bariatric programs.

Methods The bariatric surgery program was started at a safety net hospital located in a neighborhood with over twice the national poverty rate. A retrospective review was performed for patient demographics, comorbidities, preoperative diet and exercise habits, perioperative outcomes, and 1-year outcomes including percent total weight lost (%TWL) and comorbidity reduction.

Results A total of 153 patients underwent laparoscopic sleeve gastrectomy from May 2017 through December 2019. The average preoperative BMI was 47.9kg/m², and 54% of patients had diabetes. The 1-year follow-up rate was 94%. There were no mortalities and low complication rates. The average 1-year %TWL was 22.8%. Hypertension and diabetes medications decreased in 52% and 55% of patients, respectively. The proportion of diabetic patients with postoperative HbA1c \leq 6.0% was 49%.

Conclusion This is one of the first reports on the outcomes of a bariatric surgery program at a safety net hospital. This analysis demonstrates feasibility and safety, with no mortalities, low complication rates, and acceptable %TWL and comorbidity improvement. More work is needed to investigate the impacts of race, culture, and socioeconomic factors on bariatric outcomes in this population.

Keywords Bariatric surgery · Sleeve gastrectomy · Safety net hospital · Disparities · Hispanic

Key Points

- Implementing a bariatric program at a safety net hospital is safe and feasible and addresses disparities in bariatric surgery utilization seen in the USA.
- In our study of 1-year sleeve gastrectomy outcomes in a primarily Hispanic safety net population, weight loss and diabetes remission rates were comparable to those reported in the literature.
- More work is needed to investigate the impacts of race, culture, and socioeconomic factors on bariatric outcomes in our safety net population.

✉ Taylor J. James
Taylor.james@med.usc.edu

¹ Department of Surgery, LAC+USC Medical Center, University of Southern California, 1510 San Pablo Street, HCC I, Suite 514, Los Angeles, CA 90033, USA

Introduction

Bariatric surgery is the most effective treatment for severe obesity. It results in significant weight loss, reduction of obesity-related comorbidities and mortality, and improvement in quality of life compared to non-surgical treatment [1–6]. Bariatric surgery has become increasingly popular over recent years. In 2018, over 252,000 bariatric procedures were performed in the USA, which is a 10.8% increase from 2017 and a 60% increase from 2011 [7]. Despite its growing popularity, only approximately 1% of patients who qualify for bariatric surgery ever receive it [7].

Most bariatric surgery programs exist at community or university-based hospitals [8, 9]. Few are at safety net hospitals, which by legal mandate or mission provide care for all patients regardless of insurance status or ability to pay [10]. Safety net hospitals often serve patients of diverse ethnic and

socioeconomic backgrounds. Hispanic and black populations have a higher prevalence of severe obesity than white populations but are less likely to undergo bariatric surgery [11–13]. With the implementation of the Affordable Care Act in 2014, patients of ethnic minority and low-income backgrounds now undergo bariatric surgery more frequently than before, but still at lower proportions than their white and more affluent counterparts [14, 15]. In 2017, we developed a bariatric surgery program at our large urban safety net medical center serving a primarily Hispanic patient population. The purpose of this study was to evaluate program safety, feasibility, and first-year outcomes to pave the way for other safety net bariatric programs and to describe outcomes in this population with unknown bariatric success.

Methods

Our safety net medical center is one of the largest in the country, with over 150,000 emergency department visits each year. The surrounding neighborhood has a poverty rate of 28.6%, which is more than double the poverty rate in the USA [16]. In this neighborhood, 63% of people are Hispanic, and 71.5% of people speak a language other than English at home [16]. The bariatric program was modeled after the program at our university hospital affiliate. Bariatric-specific personnel were hired including bariatric surgeons, a bariatric nurse practitioner, a dietician, and a psychiatrist. A standardized preoperative pathway was developed including a mandatory group education seminar, psychiatric evaluation, and 6-month supervised diet and nutrition program. The seminar content and educational materials were taken from our university hospital's program and adapted by a third-party service to meet the language and reading level of the majority of our population. The seminar was administered in both English and Spanish, and all materials were printed in both languages. The 6-month preoperative program involved monthly meetings with the dietician to discuss healthy eating and lifestyle strategies such as limiting fat and sugar, decreasing portion size, and increasing exercise. A uniform postoperative care protocol was created which included a post-operative diet advancement plan, affordable protein and vitamin supplements, and dietician follow-up visits at 2 weeks, 2 months, 6 months, and annually. Given the lower income status of our population, if our patients had difficulty obtaining the recommended supplements, we offered alternative supplement options. It was decided to only perform laparoscopic sleeve gastrectomy at the initiation of the program due to its ease of operative standardization and the lower rates of postoperative complications and malnutrition compared to laparoscopic Roux-en-Y gastric bypass [17, 18]. Only first-time bariatric operations were performed.

A retrospective review was performed of a prospectively maintained database of patients who underwent bariatric

surgery since the program start in 2017. Preoperative variables were extracted from the medical records including patient age, body mass index (BMI), gender, race, comorbidities, referral source, and insurance status. Information on obesity history and preoperative diet and exercise habits was obtained from dietician visit documentation. Patients on at least one medication for hypertension or diabetes were considered to have hypertension or diabetes, respectively. Perioperative outcomes included operative time, hospital length of stay, 30-day complications, reoperations, and readmissions. One-year follow-up was obtained through in-person clinic visits before the coronavirus disease 2019 (COVID-19) pandemic and telephone visits during the COVID-19 pandemic. Only weights measured in clinic were used to determine weight loss. Weight loss outcomes included postoperative and programmatic average percent total weight lost (%TWL) at 1 year. Postoperative %TWL, defined as the percent total weight lost from surgery to 1 year, was calculated using the formula: $(\text{weight at surgery} - \text{weight at one year} / \text{weight at surgery}) \times 100$. Programmatic %TWL, defined as the percent total weight lost from the first bariatric clinic visit to 1 year, was calculated using the formula: $(\text{weight at first bariatric visit} - \text{weight at one year} / \text{weight at first bariatric visit}) \times 100$. Comorbidity improvement was quantified by the decrease in number or cessation of medications after surgery. Pre- and post-operative glycated hemoglobin (HbA1c) levels were collected for all patients with diabetes.

Data analyses were conducted using SPSS (SPSS Statistics 26.0; IBM Corp, Armonk, NY). Comparisons were performed using paired T-tests. Frequencies are reported as *n* (%). Parametric and non-parametric data are reported as mean \pm standard deviation and median (interquartile range), respectively.

Results

A total of 153 consecutive patients underwent laparoscopic sleeve gastrectomy from May 2017 through December 2019. Preoperative characteristics are described in Table 1. The mean preoperative BMI was 47.9 ± 5.7 kg/m². There were 99 (65%) patients who were Hispanic, followed by 25 (16%) who were black and 21 (14%) who were white. Hypertension was present in 108 patients (71%), and diabetes was present in 83 patients (54%). There were 133 patients (87%) who were referred from their primary care provider, while the others were referred from specialty clinics such as general surgery and gynecology most commonly from within the hospital. The majority of patients were insured by Medi-Cal, California's Medicaid program. Self-directed diet and exercise were attempted by 131 patients (86%) for weight loss prior to evaluation for bariatric surgery, while 32 patients (21%) participated in a formal weight loss program such as

Table 1 Patient characteristics and preoperative diet history (n=153)

Variable	N (%)
Age (yrs, mean ± SD)	47.5 ± 9.5
BMI (kg/m ² , mean ± SD)	47.9 ± 5.7
Gender, female	124 (81)
Race	
Hispanic	99 (65)
Black	25 (16)
White	21 (14)
Other	8 (5)
Comorbidities	
Hypertension	108 (71)
Diabetes	83 (54)
Insulin-dependent diabetes	30 (20)
Obstructive sleep apnea	23 (15)
Gastroesophageal reflux disease	43 (28)
Referral source	
Primary care clinic	133 (87)
Specialty care clinic	20 (13)
Insurance	
Medi-Cal	131 (86)
Medicare	11 (7)
Uninsured	9 (6)
Other publicly funded program	2 (1)
Private	0 (0)
Onset of obesity	
Adulthood	50 (32)
Adolescence	27 (18)
Childhood	76 (50)
Prior diet attempts ^a	
Self-directed diet/exercise	131 (86)
Formal weight loss program	32 (21)
Medication	21 (14)
None	4 (2)
Habits contributing to obesity ^a	
Junk food	133 (87)
Frequent snacking	89 (58)
Overeating	81 (53)
Emotional eating	74 (48)
Sedentary lifestyle	5 (3)
Reasons for desired weight loss ^a	
Improve health/longevity	108 (71)
Improve pain/mobility	46 (30)
Improve self-esteem	14 (9)
Qualify for other surgery	12 (8)

^a Percent totals may add up to greater than 100 because patients could report more than one answer

Weight Watchers or Jenny Craig. Junk food, frequent snacking, overeating, and emotional eating were commonly

reported habits that likely contributed to obesity. The most common reported reason for desired weight loss was to improve health or longevity, reported by 108 patients (71%). Other reasons included to improve pain or mobility (n=46.30%), to improve self-esteem (n=14.9%), and to qualify for another surgery such as hernia repair or knee replacement (n=12.8%).

Perioperative outcomes are outlined in Table 2. Average operative time was 125 (104–153) min. Operative complications included two conversions to open, one for bleeding and one for incorporation of the esophageal temperature probe into the gastric staple line. Thirty-day postoperative complications included two unplanned admissions to the intensive care unit for hypotension (1.3%) and two venous thromboembolic events (VTE, 1.3%). Reoperation was required in six patients: four for staple line bleeding (2.6%), one for portal vein thrombosis and ischemic bowel (0.7%), and one for stent placement for per oral intolerance (0.7%). The most common reasons for readmission were abdominal pain and nausea/vomiting managed conservatively.

One-year follow-up was available for 144 patients (94%). Measured 1-year weights were available in 98 patients (64%). Average 1-year postoperative %TWL from surgery to 1 year was 22.8 ± 8.8%. Average programmatic %TWL, which included weight lost during the 6-month preoperative interval, was 27.1 ± 8.8% (p<0.01) (Table 3). One-year comorbidity outcomes are described in Table 4. Of patients with preoperative hypertension, 56 (52%) required fewer antihypertensive medications at 1 year, and 35 (32%) were off all antihypertensives. The change in number of hypertension medications is presented in Figure 1. Of patients with preoperative diabetes, 46 (55%) decreased their diabetes medication, and 31 (37%) completely stopped. Fifteen of the 30 patients (50%) with insulin-dependent diabetes were completely off insulin 1 year after surgery. The change in number of diabetes medications is presented in Figure 2. Fifty-eight (70%) patients had a HbA1c of 6.5 or less 1 year after surgery, and 41 (49%) had a HbA1c of 6.0 or less. The average HbA1c in patients with diabetes dropped from 8.3% ± 1.0 preoperatively to 6.7% ± 1.2 after surgery (p<0.01) (Figure 3).

Table 2 Perioperative outcomes (n=153)

Outcome	N (%)
Operative time (minutes, median [IQR])	125 [104–153]
Hospital length of stay (hours, median [IQR])	52 [34–59]
Operative complications	2 (1.3)
30-day postoperative complications	4 (2.6)
Reoperations	6 (4)
Readmissions	11 (7)
Mortality	0 (0)

Table 3 Average 1-year weight loss (n=98)

Weight loss variable	% ± SD
Postoperative %TWL ^a	22.8 ± 8.8
Programmatic %TWL ^b	27.1 ± 8.8

P value <0.01

^a Percent total weight lost from date of surgery to 1 year after surgery

^b Percent total weight lost from beginning of bariatric program to 1 year after surgery

Discussion

To our knowledge, this is one of the first reports on the development and outcomes of a bariatric surgery program at a large urban safety net medical center. This analysis demonstrates feasibility and safety, with no mortalities and low overall complication rates similar to the literature [15, 19, 20]. The VTE rate of 1.3% is at the higher end of the 0.3–2.2% range reported in the literature [15, 21, 22]. All patients were placed on perioperative chemical VTE prophylaxis. The relatively high VTE rate could be due in part to the high risk of our population, as our average starting BMI and diabetes prevalence was higher than those described in many other bariatric studies, including specifically Hispanic populations [19, 20, 23–28]. Our bleed rate of 2.6% is also slightly higher than other studies of sleeve gastrectomy which report rates up to 2.5% [20, 29]. This could potentially be due to the learning curve at the start of the program and/or the teaching nature of our hospital which involves a high level of trainee autonomy. At the end of 2019, we began routinely using bioabsorbable staple line reinforcement for all cases, and since then we have had no staple line bleeds.

The 1-year follow-up rate of 94% was higher than expected in this population that likely faces barriers to obtaining consistent healthcare. The low 1-year weight measurement rate of 64% can be attributed to restrictions in in-person visits due to the COVID-19 pandemic. The average operative time of 125 min for laparoscopic sleeve gastrectomy may be a product of the teaching hospital environment. The %TWL at 1 year

was 22.8%, which is near the 23–34% reported in other studies [30–32]. Over half of patients decreased their diabetes medication 1 year after surgery, and 37% completely stopped. A few recent trials report diabetes remission after bariatric surgery of up to 60% at 1 year; however, it is difficult to compare diabetes remission across studies given variability in the definition of “remission” [23, 33, 34]. In the STAMPEDE trial by Schauer et al. comparing bariatric surgery with medical therapy on diabetes outcomes, the primary outcome was HbA1c ≤ 6.0%, which was met by 37% in the sleeve gastrectomy group [1]. In our study, 49% of patients met this criteria.

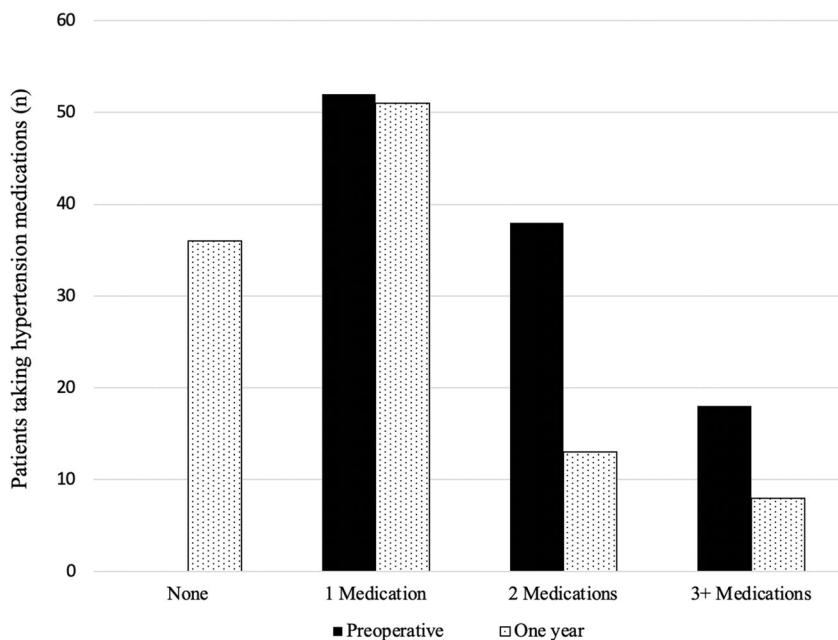
Our population was comprised of 67% Hispanic patients. The Hispanic population is the fastest-growing ethnic minority group in the USA, now comprising 18.4% of the total population [35]. Studies have shown obesity is more prevalent among ethnic minority populations, yet these patients are less likely to undergo bariatric surgery than their white counterparts [36–40]. In an analysis of the National Inpatient Sample, Kroner Florit et al. found that Hispanic patients undergo bariatric surgery at an odds ratio of 0.88 compared to non-Hispanic patients [41]. This underutilization in the Hispanic population is likely multifactorial. Compared to the non-Hispanic population, overweight and obese Hispanic Americans are less likely to try to lose weight and/or seek professional help in losing weight [39]. Hispanic patients are also less likely to be referred to bariatric surgery than non-Hispanic patients [27]. While the reasons for this are not completely understood, patient factors (such as language/cultural barriers preventing patients from seeking bariatric referrals) and system factors (such as lack of referral offered by primary care provider) likely contribute [27]. By developing a bariatric program within our patients’ existing medical community, we addressed some of these barriers. It is easy for primary care providers to refer to our program since we are located within the same county-sponsored health system. Many of our clinic staff speak fluent Spanish and have experience in our safety net setting, which decreases the language and cultural barriers that may exist for our patients at other programs.

Patients of minority backgrounds and low socioeconomic status undergo bariatric surgery at higher rates than before; however, these patients often demonstrate worse outcomes than their white counterparts. This has been consistently demonstrated in black patients, yet the effect on Hispanic patients has been less clear [19, 42–44]. While some studies show less weight loss in Hispanic patients when compared to white patients after bariatric surgery, others show similar weight and comorbidity improvement between the two groups [42–44]. When specifically evaluating blood lipid profiles, Istfan et al. found that although all races had significant improvements in blood lipids 2 years after Roux-en-Y gastric bypass, Hispanics had an increase in total cholesterol and low-density

Table 4 One-year comorbidity outcomes

Variable	N (%)
Fewer hypertension medications	56/108 (52%)
No hypertension medication	35/108 (32%)
Fewer diabetes medications	46/83 (55%)
No diabetes medication	31/83 (37%)
Insulin-dependent diabetics off insulin	15/30 (50%)
Postoperative HbA1c ≤ 6.5	58/83 (70%)
Postoperative HbA1c ≤ 6.0	41/83 (49%)

Figure 1 Change in hypertension medications before and after surgery



lipoprotein when compared to white and black patients [24]. Income has also been identified as a significant predictor of weight loss after bariatric surgery, with lower-income patients exhibiting lower weight loss [13]. Although we did not collect income data on our patients, we anticipate many of our patients come from low-income neighborhoods given the location of our hospital. In our study, 1-year weight loss and diabetes remission were similar to other reports in the literature. This is notable given our population’s average starting BMI and diabetes prevalence was higher than those described in many bariatric studies [19, 20, 23–28]. Also notable, the programmatic %TWL, which includes the weight lost during the

6-month preoperative period, was 4.3% higher than the %TWL after surgery ($p < 0.01$). This suggests the 6-month program of supervised diet, exercise, and nutrition counseling contributes to overall weight loss in our program, which may be especially important in this population with limited resources. More work is needed to identify the specific impacts of race and socioeconomic status on bariatric outcomes in our patient population.

This study has limitations. First, sleeve gastrectomy was the only bariatric procedure performed. The true differences in long-term weight loss and comorbidity reduction after sleeve gastrectomy compared to gastric bypass are currently

Figure 2 Change in diabetes medications before and after surgery

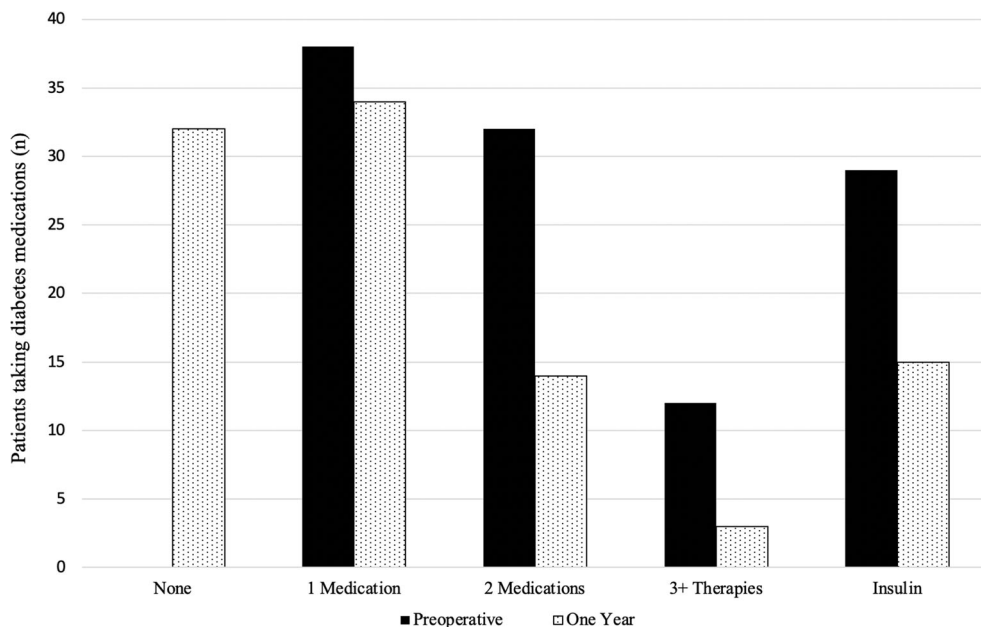
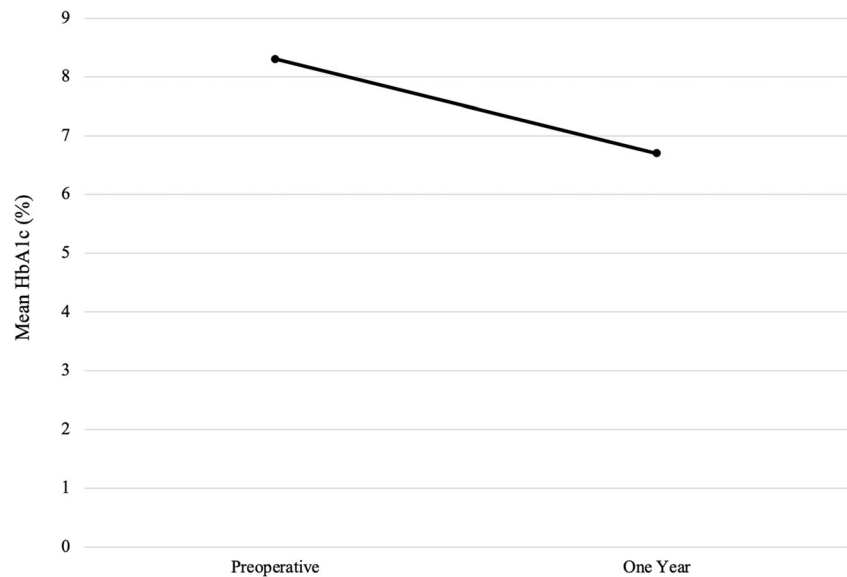


Figure 3 Change in mean glycated hemoglobin (HbA1c) ($p < 0.01$)



unknown due to the recent gain in popularity of the sleeve; however, it has been shown that gastric bypass provides better comorbidity remission in certain patients [20, 23]. Now that safety and effectiveness have been demonstrated, gastric bypass will be implemented on a case-by-case basis in our program. Second, this analysis includes 1-year weight loss in only 64% of the patient population due to in-person clinic cancellations during the COVID-19 pandemic. However, we were able to contact 94% of patients via telephone to assess comorbidity improvements at 1 year. Lastly, this experience represents only that of a single safety net hospital. The population in this study consists of a unique mix of racial and socioeconomic backgrounds and may not be generalizable to other safety net populations.

Conclusion

Safety net hospitals provide care to all patients, regardless of insurance status or ability to pay. Patients who are treated at safety net hospitals are often from low socioeconomic backgrounds and unable to pay for healthcare at other facilities. Therefore, the treatments available to these patients are limited to what is offered by the safety net center in their community. With the implementation of this program at our safety net medical center, bariatric surgery is now available for the large population in our community for whom this life-altering treatment was previously not an option. This treatment option is particularly important for patients of minority backgrounds and low socioeconomic status as these populations are shown to have high rates of obesity and obesity-related comorbidities [11, 45, 46]. More work is needed to investigate the impacts of race

and socioeconomic factors on bariatric outcomes in our safety net population.

Declarations

Ethics Approval and Consent to Participate All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study formal consent is not required.

Conflict of Interest The authors declare no competing interests.

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