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Racial variation in baseline characteristics and wait times among patients undergoing bariatric surgery

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Abstract

Background Although bariatric surgery is the most effective treatment for obesity and weight-related comorbid diseases, utilization rates are disproportionately low among non-white patients. We sought to understand if variation in baseline characteristics or access to care exists between white and non-white patients.

Methods Using a statewide bariatric-specific data registry, we evaluated all patients who underwent bariatric surgery between 2006 and 2020 and completed a preoperative baseline questionnaire, which included a question about self-identification of race. Patient characteristics, co-morbidities, and time from initial preoperative clinic evaluation to date of surgery were compared among racial groups.

Results A total of 73,141 patients met inclusion criteria with 18,741 (25.5%) self-identified as non-white. These included Black/African American ($n = 11,904$), Hispanic ($n = 3448$), Asian ($n = 121$), Native Hawaiian/Pacific Islander ($n = 41$), Middle Eastern ($n = 164$), Multiple ($n = 2047$) and other ($n = 608$). Non-white males were the least represented group, accounting for only 4% of all bariatric cases performed. Non-white patients were more likely to be younger (43.0 years vs. 46.6 years, $p < 0.0001$), disabled (16% vs. 11.4%, $p < 0.0001$) and have Medicaid (8.4% vs. 3.8%, $p < 0.0001$) when compared to white patients, despite having higher rates of college education (78.0% vs. 76.6, $p < 0.0001$). In addition, median time from initial evaluation to surgery was also longer among non-white patients (157 days vs. 127 days, $p < 0.0001$), despite having higher rates of patients with a body mass index above 50 kg/m² (39.0% vs. 33.2%, $p < 0.0001$).

Conclusions Non-white patients undergoing bariatric surgery represent an extremely diverse group of patients with more socioeconomic disadvantages and longer wait times when compared to white patients despite presenting with higher rates of severe obesity. Current guidelines and referral patterns for bariatric surgery may not be equitable and need further examination when considering the management of obesity within diverse populations to reduce disparities in care—of which non-white males are particularly at risk.

Keywords Racial disparities · Bariatric surgery · Access to bariatric surgery · Wait times for bariatric surgery · Bariatric surgery policy · Socioeconomic status

Obesity has contributed to an overwhelming disease burden in the United States with over 40% of the population aged 20 and older qualifying as obese (BMI ≥ 30) in 2017–2018 [1]. However, this burden is distributed unevenly: in comparing across different race groups, the prevalence of obesity in non-Hispanic black adults was found to be higher than

adults of any other race, and non-Hispanic black women had the highest prevalence of disease compared to adults of any race or sex [1].

Bariatric surgery is well-established as the most effective method to achieve sustainable weight loss, in addition to reducing medical comorbidities and contributing to an overall mortality benefit [2]. However, overall utilization is low [3], with less than 1% of eligible patients based on National Institutes of Health (NIH) criteria undergoing bariatric surgery [4]. Furthermore, dropout rates for referred patients remains high [3, 5–7]. Additionally, there are significant racial disparities among patients undergoing bariatric

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surgery, with black patients experiencing less weight loss, higher rates of complications, and higher rates of in-hospital mortality [8]. Racial disparities have also recently been reported in the literature with regards to access to surgery [9].

However, previous studies evaluating disparities in care among bariatric surgery patients focused on white, black and Hispanic patients. It is likely that the demographics of the bariatric surgery population is more nuanced with regards to race and socioeconomic status, thus requiring a more inclusive lens. Furthermore, it is unclear which at-risk populations could benefit from optimized referral efforts to improve equitable access.

In this context, we sought to examine factors that contribute to these disparities, and those that result in barriers to care, including factors such as insurance status and wait time [10]. To accomplish this, we used a state-wide bariatric-specific data registry which included information from a baseline questionnaire that allowed patients to self-identify by race from 9 different categories.

Methods

Study design

This study was conducted using data from the Michigan Bariatric Surgery Collaborative (MBSC), a statewide consortium of surgeons performing bariatric surgery. This initiative includes 42 teaching and non-teaching hospitals, capturing over 95% of patients undergoing bariatric surgery in the state of Michigan. Participating hospitals submit data on patient demographics, clinical characteristics, and comorbidities with centrally trained nurses abstracting data from medical records using standardized and validated instruments for various quality of life measurements and clinical classifications of patients (e.g., psychological well-being, substance use, physical limitations). Annual visits to participating hospitals are conducted by MBSC staff to audit and verify the accuracy of data collected.

Patients were included in this study were adults who underwent primary bariatric procedures from 2006 to 2020 and had completed a preoperative baseline questionnaire including questions regarding self-identification of race. Patients undergoing revisional operations and patients who did not report their race were excluded from the study.

Data collected

The baseline survey included the following options for self-identification of race: White, Black/African American, Asian, Native Hawaiian/Pacific Islander, American Indian/Alaskan Native, Middle Eastern, 'Multiple' and

'Other'. In addition, the baseline survey include data on age, sex, income, preoperative height, weight, body mass index (BMI), marital status, work status, and education. Co-morbidities examined included non-insulin-dependent diabetes mellitus (NIDDM), insulin-dependent diabetes mellitus (IDDM), hypertension, hyperlipidemia, cerebrovascular disease (CVD), coronary artery disease (CAD), gastroesophageal reflux disease (GERD), sleep apnea, asthma, other obstructive lung disorder, liver disorder, renal disorder, and psychological disorder. We also examined insurance status (private, no insurance/self-pay, Medicare, Medicaid). The wait time for surgery was calculated based on the date of the first preoperative clinic evaluation and the surgery date.

Statistical analysis

We compared racial groups on baseline characteristics, comorbidities, and time from initial presentation to surgery, using chi-square tests for categorical variables (e.g., sex) and independent samples *t*-tests for continuous variables (e.g., age). We used Wilcoxon signed-rank tests for continuous variables that had a non-normal data distribution (e.g., wait time from program start to surgery date), where we report median values rather than means. The threshold for statistical significance was set at 0.05 for all univariate analyses.

All statistical analyses were performed using SAS 9.4 (SAS Institute, Cary NC).

Results

A total of 73,566 patients underwent primary bariatric surgery between 2006 and 2020 and completed a baseline questionnaire that included self-identification of race. This represents 73.8% of the entire Michigan Bariatric Surgery Collaborative (MBSC) data registry. Table 1 includes data on baseline demographics. A total of 54,825 (74.5%) patients self-identified as white and 18,741 (25.5%) patients self-identified as non-white.

Non-white patients were further characterized as Black/African American ($n = 11,904$, 63.5%), Hispanic ($n = 3448$, 18.4%), Asian ($n = 121$, 0.6%), Native Hawaiian/Pacific Islander ($n = 41$, 0.2%), Middle Eastern ($n = 164$, 0.9%), 'Multiple' ($n = 2047$, 10.9%) and 'Other' ($n = 608$, 3.2%). White females represented the largest group of patients undergoing bariatric surgery, encompassing 58% of all procedures, while non-white males accounted for 4% of all procedures.

Non-white patients were more likely to be younger (43.0 years vs. 46.6 years, $p < 0.0001$) and were more likely to have a BMI above 50 kg/m² (39.0% vs. 33.2%, $p < 0.0001$). With regards to their socioeconomic status, non-white patients were more likely to make less than

Table 1 Baseline demographics and socioeconomic factors in white and non-white patients

	White		Non-white		<i>p</i> value
	<i>n</i>	%	<i>n</i>	%	
Total	54,825	74.5	18,741	25.5	
Male	12,429	22.7	2927	15.6	<0.0001
Female	42,396	77.3	15,814	84.4	
Income					
<\$10,000	3287	6.1	2387	13.2	<0.0001
\$10 k–\$24,999	7357	13.8	3452	19.0	
\$25 k–\$44,999	11,788	22.1	4780	26.3	
\$45 k–\$75,000	14,811	27.8	4398	24.2	
>\$75,000	16,025	30.1	3128	17.2	
College+	41,817	76.6	14,510	78.0	<0.0001
Married/Sig. other	36,989	67.7	8496	45.6	<0.0001
Employed (full/part time)	36,250	66.5	12,064	64.9	0.0001
Disabled	6199	11.4	2977	16	<0.0001
Private insurance	41,209	75.2	13,663	72.9	<0.0001
Medicare	7084	12.9	2680	14.3	<0.0001
Medicaid	2108	3.8	1572	8.4	<0.0001

\$10,000 (13.2% non-white vs. 6.1% white; $p < 0.0001$), report that they were disabled (16% non-white vs. 11.4% white; $p < 0.0001$), and have Medicare (14.3% non-white vs. 12.9% white; $p < 0.0001$) or Medicaid (8.4% non-white vs. 3.8% white $p < 0.0001$) insurance, despite higher rates of at least some college education (non-white 78.0% vs. white 76.6, $p < 0.0001$). In addition, a total of 59% of non-white patients making less than \$45,000 per year compared to only 42% for white patients ($p < 0.0001$).

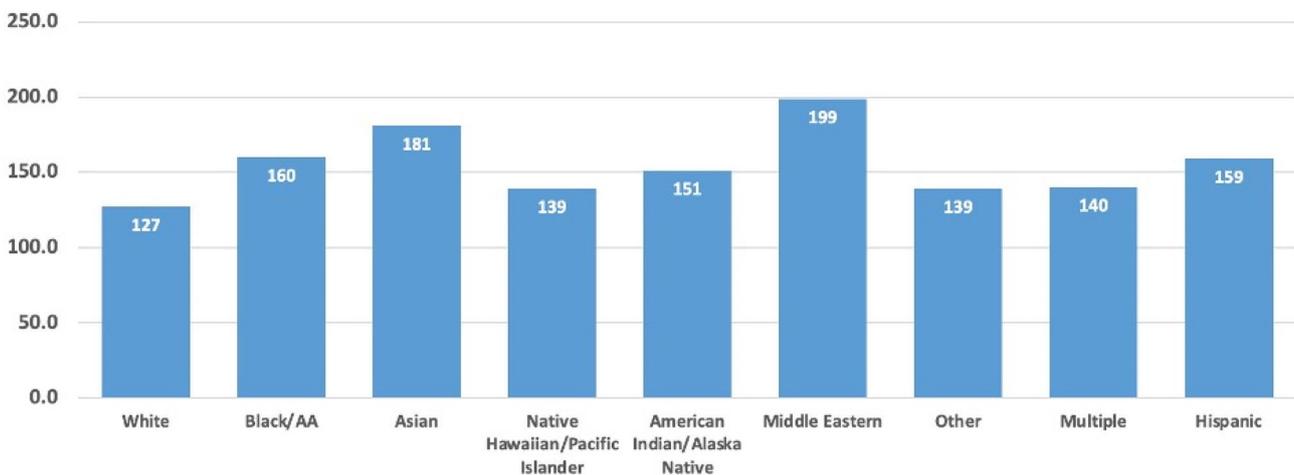
With respect to preoperative comorbidities, white patients were more likely to have a BMI $< 40 \text{ kg/m}^2$ (16.0% white vs. 12.7% non-white; $p < 0.0001$) and more likely to

have hyperlipidemia (50.0% white vs. 40.5% non-white; $p < 0.0001$), GERD (51.8% white vs. 47.6% non-white; $p < 0.0001$), and psychological disorders (56.8% white vs. 44.3% non-white; $p < 0.0001$). White patients were less likely to have asthma (20.6% white vs. 25% non-white; $p < 0.0001$). Preoperative comorbidities were associated with prolonged wait times, except ‘other obstructive lung disorder,’ and non-white patients were shown to have higher rates of comorbidities, but looking at whether race or BMI confounded the relationship between preoperative comorbidities and prolonged wait times was outside the scope of the study.

Median wait times by race is presented in Fig. 1, though multivariate analysis was precluded by inadequate sample sizes. When comparing white vs. non-white patients, non-white patients had longer wait times than white patients (157.0 days vs. 127.0 days white, $p < 0.0001$). After stratifying by insurance status, non-white patients continued to have higher median number of days for surgery than white patients, with non-white Medicaid patients waiting the longest time at a median of 243 days (Table 2).

Table 2 White versus non-white median wait times for surgery stratified by insurance type

	White		Non-white		<i>p</i> value
	<i>n</i>	Median #of days	<i>n</i>	Median #of days	
Private insurance	41,147	131	13,641	154	<0.0001
Medicaid	2106	193	1570	243	<0.0001
Medicare	7074	117	2675	137	<0.0001
No insurance/self pay	2404	102	599	131	<0.0001

**Fig. 1** Median wait times by race

To further examine the role of insurance-mandated weight loss programs in wait times, we analyzed patients under the most highly represented insurance payor, Blue Cross Blue Shield Michigan (BCBSM), representing 27.6% ($n = 15,116$) of patients. We found that patients eligible to waive this requirement ($BMI \geq 50$) had shorter median wait times compared to patients $BMI < 50$ [109 days vs. 188 days; $p < 0.0001$].

Discussion

This is the first study to examine the diversity of bariatric surgery patients by including 9 different categories for race. Our findings demonstrate that non-white males were the least represented patients and that non-white patients experience longer periods of time between initial evaluation and surgery date when compare to white patients, even though non-white patients were more likely to present with higher rates of severe obesity ($BMI > 50$). While bariatric surgery is well-established as the most effective treatment for obesity, it remains underutilized among eligible patients [11], and utilization also varies considerably by gender and race. Our data indicates that observed disparities may be due to inequities in access to health care as a result of barriers that may delay the process of undergoing surgery [12–14]. These findings were particularly interesting, as the inequities persisted even after stratifying by insurance status.

Racial disparities in bariatric surgery outcomes have been reported in previous studies from the MBSC [15]. Notably, black patients were found to have less weight loss, higher rates of 30-day adverse events and resource utilization [8, 12, 15–17]. The authors indicated that racial and cultural differences should be considered when developing strategies to optimize care; however, they did not evaluate whether timely access to care was uniform between groups. As such, examining access to care as a contributing factor to worse outcomes becomes important. Our study further expands on the topic of equitable access to surgical intervention for severe obesity and identifies at risk groups by both race and gender.

Based on data from a single center academic bariatric surgery program in Michigan, overall median wait times for bariatric surgery have increased from 86 to 159 days between 2006 and 2016 [18]. Although complex patients with Medicaid insurance experienced the longest wait times, the authors also found that non-white patients experienced longer wait times than white patients [18]. The study highlights the complexity of the preoperative process for bariatric surgery, which is resource-intensive, requiring numerous interactions with healthcare providers across multiple disciplines, with structural racism as a potential cause [19, 20]. One aspect of this process includes the presence of

mandated weight loss programs that vary based on state and payors' policies. These program requirements are often vague and currently do not follow any standardized criteria. Although some specify a required 3, 6, or 12 months of documented medically supervised weight loss, some insurance carriers have no specification at all for duration of attempted weight loss. Our study demonstrated that for a single insurance payor, such mandated weight loss programs contribute significantly to longer wait times for surgery by 172%. This finding was especially interesting given that non-white patients had longer wait times, despite representing the highest proportion of patients with preoperative BMIs ≥ 50 . While addressing mandated weight loss programs is crucial for decreasing wait times for patients, it is important to highlight discriminatory practices intrinsic to the healthcare system and the bariatric surgery preoperative process.

One reason why patients may experience delays during the process of satisfying pre-operative requirements is health literacy, which is associated with non-white race and lower socioeconomic status (ref). While the National Institutes of Health recommends that patient medical information should be delivered at a 7th grade level or below [21], research has demonstrated that many sources of medical information require a 10th grade reading level to interpret [22]. Furthermore, language barrier may contribute to health literacy as well, given that most materials and education are typically delivered in English. Some studies have noted lowest rates of health literacy in Latinx and Asian American and Pacific Islander (AAPI) groups, specifically in immigrant communities [23]. Some strategies to address this include improving the readability and certified translations of patient accessible information regarding bariatric surgery procedures, arranging individualized informational meetings with patients to go over preoperative requirements according to their insurance specifications, and utilizing simplified preoperative checklists to help with tracking insurance requirements. More work is required at a policy level to address such disparities in health literacy. Another reason why patients may experience delays in surgery may be due to an inability to physically attend all required appointments. Specifically, patients may be at a disadvantage to satisfy such preoperative requirements especially if they have limited means for transportation or have employment that affects when they can attend appointments. Our study demonstrated that non-white patients were more likely to be disabled, have Medicaid and more than half had an annual income of less than \$45,000—all of which can contribute to difficulties in fulfilling preoperative requirements to proceed with bariatric surgery. In a study by Birkmeyer et al. patients with lower SES were less likely to undergo bariatric surgery and the relationship between SES and morbid obesity has been shown to be inversely related [24]. As a result, it is important for bariatric surgery programs to develop individualized, equitable,

and culturally sensitive approaches to help patients navigate through the complex preoperative process.

Variation in bariatric surgery utilization can also be explained by differences in patients presenting for bariatric surgery and provider referral patterns [25]. For example, in a retrospective chart review of 4736 patients, Johnson-Mann et al. found that male and Hispanic patients were less likely to be referred to a bariatric surgeon [9]. Similarly, in a cross-sectional study of 337 patients with BMI > 35 kg/m² seen at four diverse primary care practices in Greater-Boston, Wee et al. found that African Americans and men were less likely to have been recommended for surgery by their doctors [26], which was interesting given that physician recommendation of bariatric surgery was independently associated with serious consideration for surgery. This intersectionality between race and gender is also demonstrated in our data, as non-white males presented with higher BMIs were lowest utilizers of bariatric surgery and were also subjected to the longest wait times. Of note, race did not seem to predict surgeon decision to operate [27].

Cultural values are another important consideration when evaluating bariatric surgery utilization and access. In the same study previously mentioned by Wee et al., men and African Americans were less likely to seriously consider bariatric surgery [26]. Dissatisfaction with body image may also affect decision to seek treatment for obesity and may not be uniform by race or gender. In a study by Grilo et al. women with severe obesity were more likely to report higher body image dissatisfaction than men [28]. Our study further supports the association between obesity, body image and health as non-white males were the lowest utilizers of bariatric surgery despite having higher rates of severe obesity (BMI > 50). As such, it is important to consider personal values towards health and obesity as well as body satisfaction when counseling patients about bariatric surgery as they may be dictated by cultural norms that may vary by race [29]. A qualitative study examining perceived barriers for Pacific Islanders in pursuing bariatric surgery in New Zealand identified two primary themes: confidence negotiating the medical system, including emotional safety in clinical settings and relating to non-Pacific health professionals and appropriate support to achieve preoperative goals, including cultural considerations [29]. Furthermore, a narrative review article by Incoian et al. published in 2021 identified cultural-specific considerations to potentially discuss with Middle Eastern patients, including religion in the context of perioperative nutrition with Ramadan as an example [30, 31]. Consequently, it is important for bariatric surgery programs to develop a racially and ethnically sensitive approach to discussing surgery, particularly in male and non-white patients interested in surgery.

It is also important to recognize that candidacy for bariatric surgery is predicated on BMI and associated

comorbidities even though BMI and severity of health conditions can vary by race. For instance, Asian populations have a higher cardiovascular risk when compared to Westerners at any BMI level [32, 33]. Additionally, non-white patients are at higher risk of having diabetes or hyperlipidemia at substantially lower BMIs (~ 6 kg/m²) compared to white patients [32]. Similarly, in a study of 1864 patients comparing Iraqi versus Swedish normal-weight (BMI < 25 kg/m²) individuals, 21.2% of Iraqis versus 9.3% of Swedes were insulin-resistant [34]. Given that the severity or onset of weight-related comorbidities may vary by race, gender and age, indications for bariatric surgery may need to reflect this variation to provide equitable care in a diverse population. This is especially important when considering the proven beneficial effects of bariatric surgery on diabetes particularly in patients with a BMI < 30 [35].

This study has a few limitations to consider. First, patients were asked to self-identify based on race, which is the optimal method for collecting race/ethnic data but may have issues with validity and reliability [14]. Subsequently, questions about culture, ethnicity or personal values were not captured, which limits the utilization of this data to address their impact on bariatric surgery utilization or access. Also, patients had the option to select “Other” or “Multiple”, which may lead to inaccurate or misclassification of race, while failing to recognize mixed-race patients as part of the analysis. However, these patients represented a small portion of the overall study cohort and warrants a separate analysis, which will be considered in the future. Finally, this data represents findings from a single state in the United States, which may not be generalizable to other states or countries, where the distribution of the population by race may be different. Nevertheless, the study cohort includes over 70,000 patients undergoing bariatric surgery, performed at a variety of institutions (academic and private practice) over a 14-year period.

Further research directions may examine differences between racial groups described in this study that have not been targeted in the past. These efforts may involve educating patients and their referring providers on indications for appropriate referral. Future endeavors may include further research through a more nuanced lens with regards to race, as well as legislative reform and healthcare advocacy to change cutoffs for insurance reimbursement and insurance-mandated weight loss requirements.

Conclusions

Bariatric surgery is underutilized in non-white patients, particularly non-white males. Non-white patients were more likely to have socioeconomic disadvantages and experience longer periods of time between initial evaluation

and surgery, despite presenting with higher rates of severe obesity. Given the beneficial effects of bariatric surgery on obesity and metabolic disease, strategies to improve equitable utilization within a diverse patient population should be considered.

Declarations

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