Surgical Endoscopy (2023) 37:2215–2223
https://doi.org/10.1007/s00464-022-09451-z

2022 SAGES ORAL

Chronic psychiatric diagnoses increase emergency department utilization following bariatric surgery

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Received: 20 March 2022 / Accepted: 5 July 2022 / Published online: 25 July 2022

Abstract

Introduction This study aims to evaluate the impact mental health disorders have on emergency department (ED) utilization following bariatric surgery. We hypothesize that the presence of preexisting psychiatric diagnoses is predictive of increased post-bariatric surgical ED usage as compared to a matched cohort without psychiatric comorbidities.

Methods and procedures We utilized the Colorado All Payers Claim Database to identify patients undergoing laparoscopic sleeve gastrectomy, gastric band, or gastric bypass, ($N=5393$). Patients with preexisting diagnoses of schizophrenia or bipolar disorder (PSY), and no concomitant mental health diagnosis were included ($N=427$). Patients without a psychiatric diagnosis (CON) were used for comparison. Propensity score matching in a 1:1 ratio was done matching for age, sex, BMI, procedure type, and comorbidities. Baseline ED utilization was calculated over the year preceding surgery.

Results A total of 240 patients with bipolar disorder or schizophrenia were identified. After matching, baseline ED utilization was 62% higher in the PSY group (ED visits per person per month (EDVPP) of 0.17 (95%CI 0.16–0.18) in the PSY group compared to 0.10 (95%CI 0.09–0.12) in the CON group). ED utilization increased dramatically in the month following surgery for both PSY and CON groups (EDVPP 0.58 (95%CI 0.52–0.65) vs 0.34 (95%CI 0.28–0.41)), but visits returned to baseline for the CON but not PSY patients by three months after surgery (11% vs 60% above baseline, respectively). In the PSY group, ED utilization remained elevated at 18% above baseline for two years post-surgery (EDVPP 0.20 (95%CI 0.19–0.22).

Conclusions Bariatric patients with schizophrenia or bipolar disorder have higher baseline ED usage compared to a matched cohort. ED usage increases post-operatively in all patients but to a greater extent in patients with these diagnoses. Such patients would benefit from intensive outpatient follow-up to limit ED visits.

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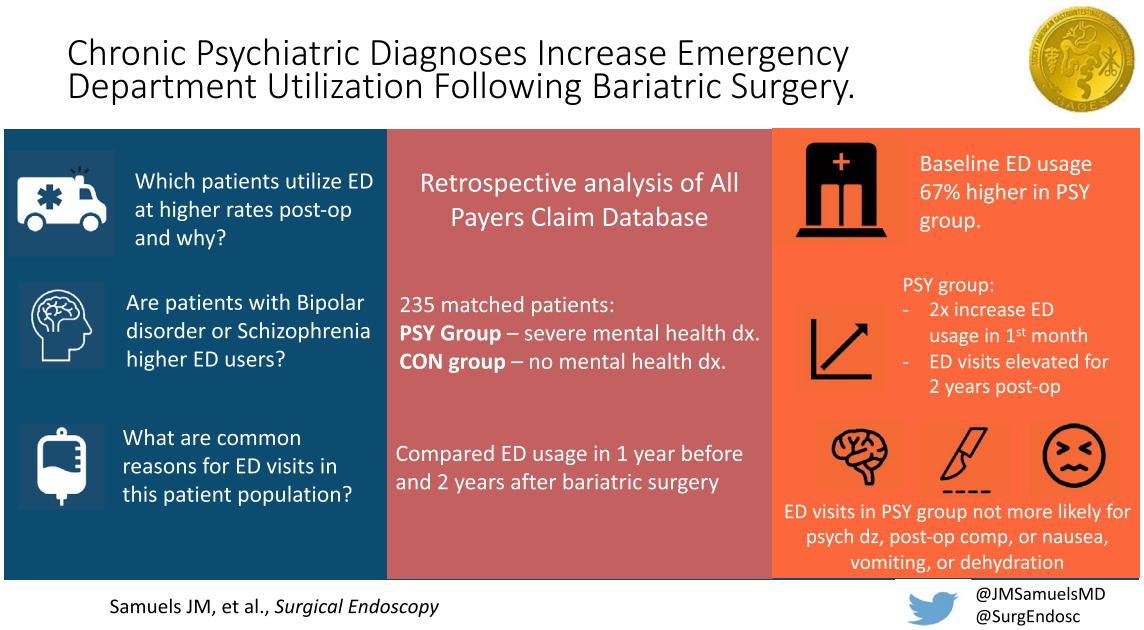
Graphical abstract



Keywords Bariatric surgery · Bipolar disorder · Schizophrenia · Emergency department visit

Bariatric surgery, including sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RNYGB), is the most effective therapy to date for the treatment of severe obesity [1, 2]. However, studies evaluating the cost-effectiveness have found mixed results, with studies finding that costs are elevated in the first 12–24 months after surgery. Studies from the United States and other health care systems have suggested an increased costs in the first 1–5 years after surgery [3–6], while modeling studies evaluating the cost-effectiveness using quality adjusted life years have suggested bariatric surgery is cost-effective [7]. The explanation for such mixed results is due in part to the increased usage of emergency departments (ED) for symptoms related to bariatric surgery such as nausea, vomiting, abdominal pain, or dehydration.

While bariatric surgery itself introduces a significant investment for a healthcare system, studies have shown that health care costs in patients who undergo bariatric surgery are elevated for several years post-operatively. Smith et al. compared the health care expenditures of a cohort of 2498 bariatric patients and a matched non-surgical cohort with obesity. The authors excluded the costs of the initial surgery. After excluding the costs of surgery, Smith et al. found that the surgical cohort had higher overall health care costs for a full five years after surgery [8]. Emergency department (ED) visits in the post-operative period may explain some of these increased costs in the bariatric surgery population. Several studies have shown an increased usage of ED visits in the post-bariatric surgery patient population, and several factors have been associated with increased ED usage [9–11]. Ghaferi et al. found in a retrospective analysis of 62,000 patients who underwent bariatric surgery, 8% visited the ED in the 90-day post-operative period with less than half requiring an admission. The average cost of each avoidable ER visit was $4,351 compared to $113 for a similar urgent care visit. Therefore, Ghaferi et al. estimated that within this single state, if all avoidable visits were triaged to a more cost-effective setting, the state could save $1.6 million [12]. Identifying subgroups at heightened risk for avoidable emergent care usage would allow focused efforts toward preventing such events.

Prior studies have raised concerns for worse outcomes following bariatric surgery in patients with concurrent mental health disease, such as schizophrenia or bipolar disorder. Studies have shown that patients with preexisting psychiatric diagnoses such as depression, bipolar disorder, or schizophrenia experience longer length of stay post-operatively, more frequent readmissions, and increased need for reoperation [13–15]. Few studies have evaluated the impact on ED usage in this patient population, suggesting an increased frequency of visits at 1–2 years after surgery. [16] The underlying cause for this heightened use of ED visits has yet to be studied.

The aim of this study is to assess the impact of preexisting schizophrenia or bipolar disorder on emergency department visits following bariatric surgery and the causes for these visits. We hypothesize that a diagnosis of mental health disorder will be associated with a higher use of the ED following surgery.

Materials and methods

Patient selection

We utilized the Colorado All Payers Claim Database, a statewide insurance database and identified patients undergoing either laparoscopic sleeve gastrectomy (SG) or roux-en-y gastric bypass (RNYGB, $N=5393$). Psychiatric diagnoses were determined by International Classification of Disease (ICD) 9/10. Inclusion criteria included patients with an isolated preexisting diagnoses of schizophrenia or bipolar disorder documented in the year prior to surgery. Appendix 1 provides complete list of ICD 9/10 codes used. Exclusion criteria included patients with a separate psychiatric diagnosis, patients who underwent revisional bariatric surgery as their index surgery, patients < 16 years old, and patients without a year of data prior to their index bariatric surgery. Bariatric surgeries and other procedures were determined using Current Procedural Terminology codes.

Primary and secondary outcomes

The primary outcome of interest is ED visits. Secondary outcomes of interest are diagnoses associated with ED visits and post-surgical complications (e.g., anastomotic leak, marginal ulcer, reflux, or stricture). ED visits were identified using the ED Flag in the database. Insurance claims in the database that originated with an ED visit were flagged as such. Some patients had multiple insurance claims with the same date with an ED flag. These represent ED-to-ED transfers, and these claims were combined as a single ED visit rather than multiple.

Comparison group & matching

A control group of patients without any psychiatric diagnosis (e.g., anxiety, depression, or substance abuse) were used for comparison. Propensity score matching (PSM) in a 1:1 ratio was used to identify a cohort of patients with similar age, sex, obesity severity, procedure type, and comorbidities. This was done using a nearest-neighbor methodology with a caliper of 0.25. The following covariates were used in propensity score matching: gender, age in years, type of bariatric procedure, insurance type, BMI category, and the presence of COPD, asthma, hypertension, diabetes, osteoarthritis, obstructive sleep apnea, hyperlipidemia, cancer, GERD, or smoking.

Statistical analysis

Medians (with interquartile range) and percentages were compared using the Wilcoxon-Mann–Whitney test, chi-square test, and Fisher's exact test as appropriate. Baseline rates of ER utilization and admissions were calculated using ER and inpatient visit rates from 1 month to 1 year prior to surgery. The mean and standard deviation of rates across these 11 months were used to calculate a 95% confidence interval; rates outside the 95% confidence interval are considered to be significantly different than the baseline rate.

Results

Study population

A total of 5393 patients underwent bariatric surgery. Of these, 2037 were found to have a psychiatric diagnosis. After further exclusions, 240 patients were identified who had isolated bipolar disorder or schizophrenia (Fig. 1). Prior to matching, patients with bipolar/schizophrenia were more likely to have public insurance ($p<0.001$) and had higher incidence of comorbidities including hypertension, COPD, asthma, obstructive sleep apnea, GERD, and smoking compared to the control group ($N=3356$, Table 1). There were no significant differences between groups with regard to gender, age, procedure type, or BMI categories.

Matched comparison of ED utilization

After PSM, there were no significant differences between groups across matched variables (Table 2). Baseline ED utilization was 62% higher in the psychiatric diagnosis group. ED utilization increased dramatically in the month following surgery for both groups, but quickly returned to baseline for the group without a psychiatric diagnosis following the two months after surgery (Fig. 1). In the group with a psychiatric diagnosis, ED utilization remained elevated above baseline for two years post-surgery (Fig. 2).

Reasons for ED utilization

While baseline visits for psychiatric diagnoses were higher in the PSY group compared to the CON group (3.1% vs 0% Fig. 3a), this difference was inconsistent post-operatively, with the PSY group experiencing greater number of ED visits than the CON group only at the 3–6-month period (Fig. 3a). Neither at baseline nor at any post-operative time did the groups differ at the rate of ED visits for abdominal

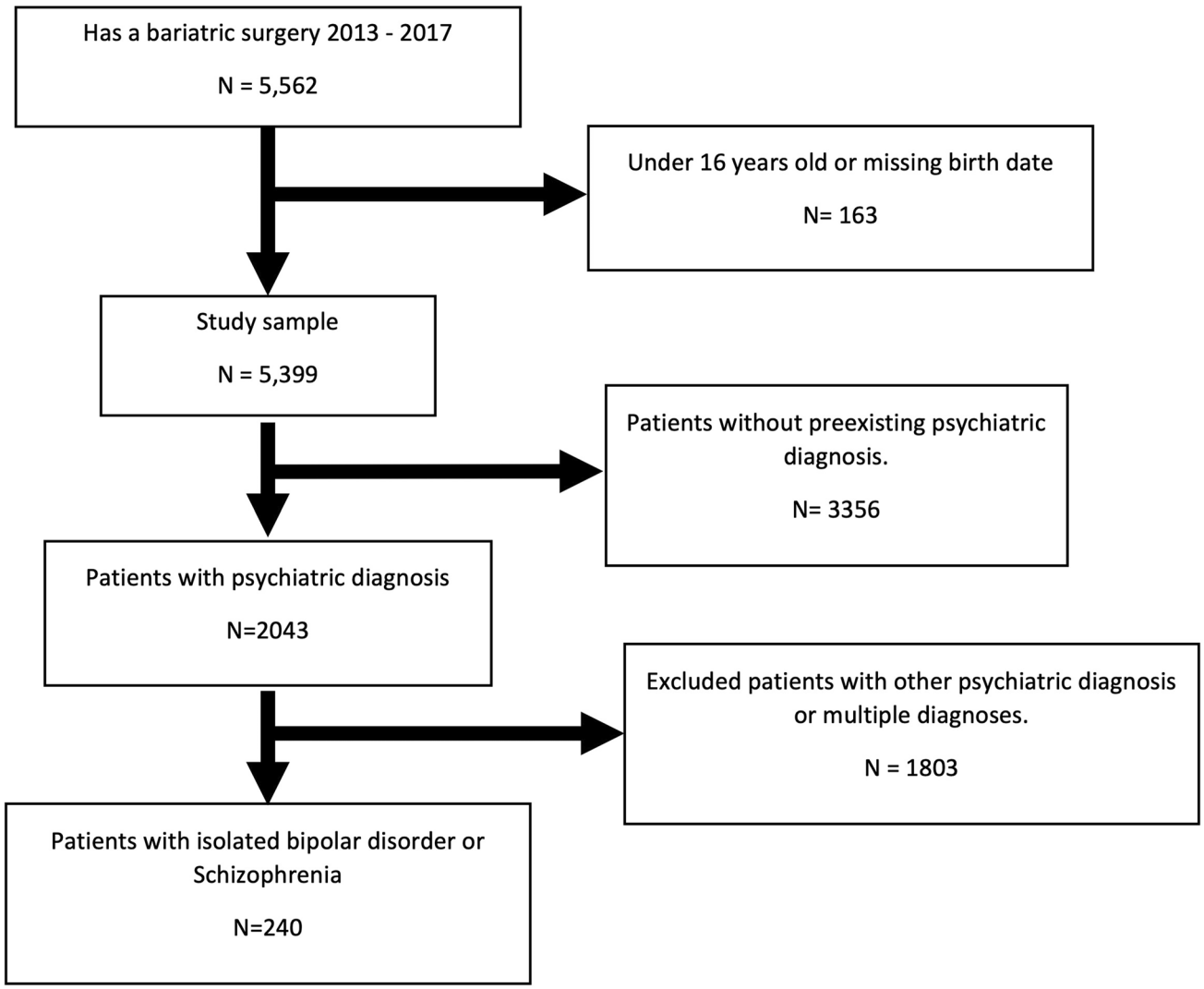


Fig. 1 STROBE diagram

pain (Fig. 3b) or post-operative symptoms of nausea, vomiting, or dehydration (Fig. 3c). The groups also did not differ at any time point in the rate of ED visits for post-operative complications (Fig. 3d). For visits due to abdominal pain, nausea, vomiting, or dehydration, the two groups experienced a similar pattern of elevated visits in the first post-operative month, with a slow, steady decline in the months following.

Discussion

Maximizing the cost-effectiveness of bariatric surgery requires an approach that maximizes the clinical benefit of surgical weight loss, while minimizing the amount of unnecessary health care resource utilization in the post-operative period. One method to achieve this goal is to provide strategies that decrease the need or unnecessary use of the ED, and by identifying patients at elevated risk of such visits. This study identified a cohort of patients, those with preexisting schizophrenia or bipolar disorder, as a population more likely to utilize the ED with a nearly threefold higher ED usage in the first 2 months after bariatric surgery compared to a matched cohort. This population had a persistently elevated rate of ED usage over the group's preoperative baseline and the matched control cohort for two years after surgery. However, these visits do not appear to be due psychiatric-related issues or to symptomatic issues following bariatric surgery such as nausea, vomiting, dehydration, or abdominal pain. This population would likely benefit from aggressive follow-up to identify the potential for post-operative problems, and advanced telehealth strategies may provide a cost-effective method for mitigating ED usage. These strategies should be employed for an extended period after bariatric surgery.

Table 1 Comparison of the two groups prior to matching cohorts

	No psychiatric diagnosis ($n=3356$)	Bipolar or schizophrenia diagnosis ($n=240$)	p-value
Male gender (%)	696 (21)	40 (17)	0.2
Insurance (%)			< 0.001
Private	1057 (32)	22 (9)	
Medicare	584 (17)	66 (28)	
Other/none	307 (9)	8 (3)	
Medicaid	1407 (41.9)	144 (60)	
Age (years, median [IQR])	45 [36—55]	44 [35—51]	0.08
Procedure (%)			0.3
Lap Band	107 (3)	8 (3)	
Lap RYGB	1215 (36)	102 (43)	
Lap Sleeve	2002 (60)	128 (53)	
Other	32 (1)	2 (1)	
COPD (%)	883 (26)	99 (41)	< 0.001
Asthma (%)	688 (21)	77 (32)	< 0.001
Hypertension (%)	1807 (54)	147 (61)	0.03
Diabetes (%)	1125 (34)	93 (39)	0.1
Osteoarthritis (%)	786 (23)	79 (33)	0.001
Obstructive sleep apnea (%)	1370 (41)	131 (55)	< 0.001
Congestive heart disease (%)	124 (4)	17 (7)	0.02
Renal disease (%)	176 (5)	11 (5)	0.8
Hyperlipidemia (%)	1305 (39)	107 (45)	0.09
Cancer (%)	580 (17)	51 (21)	0.1
NAFLD (%)	367 (11)	37 (15)	0.04
Venous stasis disease (%)	82 (2)	10 (4)	0.2
GERD (%)	1268 (38)	110 (46)	0.02
Smoking status (%)	233 (6.9)	37 (15.4)	< 0.001
Obesity category (%)			0.06
BMI 30–40	624 (19)	35 (15)	
BMI 40–50	1809 (55)	123 (52)	
BMI 50–60	657 (20)	63 (27)	
BMI 60+	174 (5)	14 (6)	

IQR interquartile ratio, *RYGB* roux-en-y gastric bypass, *COPD* chronic obstructive pulmonary disease, *NAFLD* non-alcoholic fatty liver disease, *GERD* gastroesophageal reflux disease, *BMI* body mass index

Schizophrenia and bipolar disorder have both been shown to impact outcomes following bariatric surgery in several ways. Weight loss does not appear to differ between groups with psychiatric conditions compared to subjects without preexisting diagnoses. Neither Friedman et al. nor Jalilvand et al. found difference in weight loss at 12 and 24 months after bariatric surgery compared to a matched cohort [13, 17]. Similarly, Archid et al. found comparable outcomes following sleeve gastrectomy in patients with schizophrenia compared to a matched cohort with no psychiatric diagnosis [18]. However, previous studies have found an association with preexisting psychiatric diagnoses with increased 30-day readmissions. Litz et al. found that patient with preexisting psychiatric diagnosis had 34% greater odds of readmission within 30 days after bariatric surgery, and the risk of readmission increased with increasing number of psychiatric diagnosis (59% odds with three concomitant psychiatric diagnoses) [19]. Jalilvand et al. in their unmatched comparison found that patients with Bipolar disorder had a tenfold higher 30-day readmission rate compared to a control cohort [13].

Prior studies have also shown an elevated rate of ED visitation in a bariatric population with preexisting psychiatric diagnoses. Fisher et al. found that patients with underlying psychiatric diagnoses were 60% more likely than a cohort without a preexisting diagnosis to have visit the ED within 3 months after surgery [16]. Kim et al. had similar findings reporting that patients with mental illness required the ED in the post-operative setting at a 73% greater rate of ED visits than those without mental illness in the first year after

Table 2 Comparison of patients after matching cohorts

	No psychiatric diagnosis ($n=235$)	Bipolar or schizophrenia ($n=235$)	p-value
Male gender (%)	45 (19)	39 (17)	0.6
Insurance (%)			0.2
Private	20 (9)	21 (9)	
Medicare	87 (37)	66 (28)	
Other/none	7 (3)	8 (3.4)	
Medicaid	121 (52)	140 (60)	
Age (years, median [IQR])	45 [35–58]	44 [35–51]	0.2
Procedure (%)			0.9
Lap Band	7 (3)	8 (3)	
Lap RYGB	95 (40)	98 (42)	
Lap Sleeve	131 (56)	127 (54)	
Other	2 (1)	2 (1)	
COPD (%)	94 (40)	97 (41)	0.9
Asthma (%)	74 (32)	76 (32)	0.9
Hypertension (%)	154 (66)	145 (62)	0.4
Diabetes (%)	105 (45)	91 (39)	0.2
Osteoarthritis (%)	83 (35)	77 (33)	0.6
OSA (%)	134 (57)	129 (55)	0.7
Congestive heart disease (%)	20 (8)	17 (7)	0.7
Renal disease (%)	17 (7)	11 (5)	0.3
Hyperlipidemia (%)	116 (49)	107 (46)	0.5
Cancer (%)	55 (23)	49 (21)	0.6
NAFLD (%)	32 (14)	37 (16)	0.6
Venous stasis disease (%)	5 (2)	10 (4.3)	0.3
GERD (%)	119 (51)	107 (46)	0.3
Smoking status (%)	33 (14)	35 (15)	0.9
Obesity category (%)			0.9
BMI 30–40	30 (13)	35 (15)	
BMI 40–50	129 (55)	123 (52)	
BMI 50–60	63 (27)	63 (27)	
BMI 60+	13 (6)	14 (6)	

IQR interquartile ratio, *RYGB* roux-en-y gastric bypass, *COPD* chronic obstructive pulmonary disease, *NAFLD* non-alcoholic fatty liver disease, *GERD* gastroesophageal reflux disease, *BMI* body mass index

surgery [20]. No previous study has examined the underlying cause for this higher usage of urgent and emergent medical care in patients with mental illness. While our study found that the PSY group had a greater overall increase in post-operative ED utilization, these visits were not due to exacerbations of common somatic symptoms following bariatric surgery such as nausea, vomiting, dehydration, or abdominal pain. These visits were also not a result of psychiatric issues or post-operative complications.

One possible explanation for the increased rate of ED visits in the PSY group is the lack of health care access among patients with bipolar disorder and schizophrenia. Previous studies have shown that patients with severe mental illness have higher rates of preventable cardiovascular diseases and undergo less cancer screening, likely resulting from a lack of access to primary care [21, 22]. One can anticipate that these patients thus rely on the ED for a variety of conditions at baseline, as demonstrated by our cohort with a 62% higher rate of ED visits prior to surgery in the PSY group compared to matched control. Therefore, these patients have a greater risk for persistently elevated ED usage after bariatric surgery, but importantly not necessarily due specifically to common post-bariatric surgical issues. Ensuring these patients have adequate post-operative follow-up and arrangement with a primary care physician before surgery may minimize these ED visits.

This study has several limitations beyond the retrospective nature of the study. First, as this study relies on accurate coding of diagnoses and patients seeking care for the mental health conditions in question to be diagnosed, it is possible

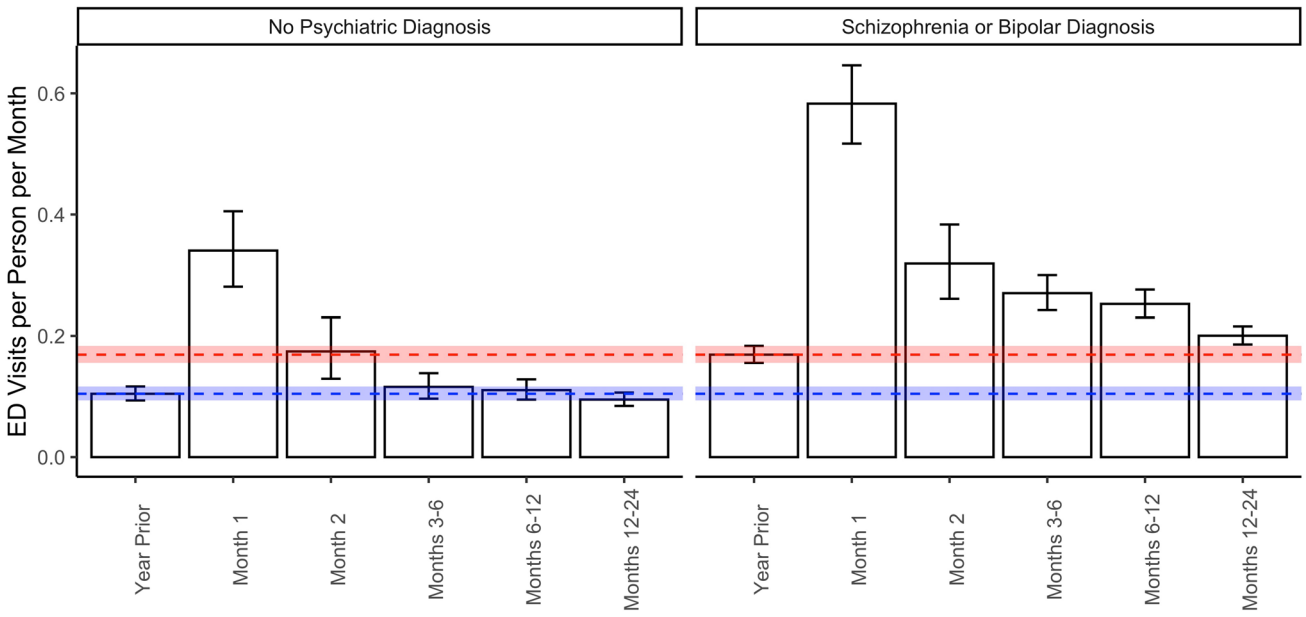


Fig. 2 ED usage in the 1 year before and 2 years after surgery

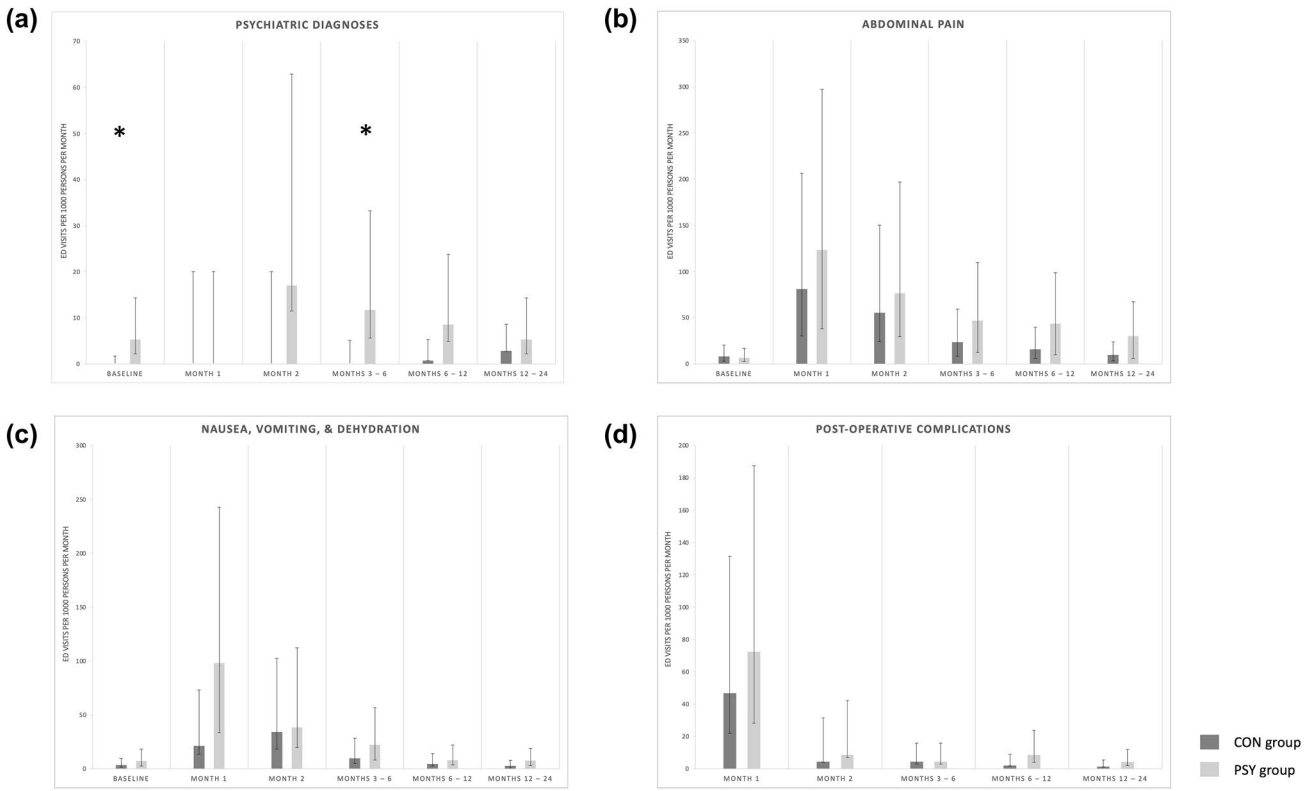


Fig. 3 Matched comparison of ED visits per persons per month between the group with Bipolar or Schizophrenia (PSY) and group without preexisting psychiatric diagnosis (CON) for **a** psychiatric diagnoses, **b** abdominal pain, **c** nausea, vomiting, or dehydration, and **d** post-operative complications

that we failed to identify or misidentified patients with mental health conditions. Secondly, given that patients are frequently required to undergo mental health screening prior to being approved for bariatric surgery, there may be a bias toward well-controlled or mild to moderate mental illness. Our cohort may thus not reflect the outcomes of patients with more severe mental illness.

Conclusion

This study further defines the incidence and causes for emergency department visits in patients with severe mental illness following bariatric surgery. We found that patients with bipolar disorder or schizophrenia utilize the ED at a higher rate than bariatric patients without mental illness at baseline and at a greater rate in the post-operative period. However, this increased ED usage is not due to visits for exacerbations of the underlying psychiatric disease, for common post-bariatric surgical problems such as nausea, vomiting, dehydration, or abdominal pain, or due to post-operative complications. Further studies should be done to prospectively evaluate the use of intensive follow-up strategies to limit these ED visits in this population.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s00464-022-09451-z.

Funding No extramural funding was utilized for this study.

Declarations

Disclosures Drs. Jason Samuels, Heather Carmichael, Kweku Hazel, Catherine Velopulos, Kevin Rothchild, and Jonathan Schoen have no conflicts of interest or financial ties.

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