Published in final edited form as:

Surg Obes Relat Dis. 2014 ; 10(3): 508–513. doi:10.1016/j.soard.2013.12.014.

High Risk Alcohol Use after Weight Loss Surgery

Christina C. Wee, MD, MPH, FACP¹, Kenneth J. Mukamal, MD, MPH¹, Karen W. Huskey, MPH¹, Roger B. Davis, ScD¹, Mary Ellen Colten, PhD², Dragana Bolcic-Jankovic, MA², Caroline M Apovian, MD³, Daniel B. Jones, MD, FASP⁴, and George L. Blackburn, MD, PhD⁴

¹Division of General Medicine and Primary Care, Department of Medicine, Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, MA

²Center for Survey Research, University of Massachusetts, Boston, MA

³Center for the Study of Nutrition Medicine, Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, MA. Evans Department of Medicine, Boston Medical Center, Boston, MA

⁴Division of Minimally Invasive Surgery, Department of Surgery, Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, MA

⁵Department of Surgery, Boston Medical Center, Boston, MA

Abstract

Background—Bariatric or weight loss surgery (WLS) may alter alcohol metabolism resulting in a higher prevalence of problem drinking post-operatively. Few studies distinguish those who report improvements in drinking from those who report worsening behavior after surgery.

Objectives—To characterize high risk alcohol use before and after WLS and according to surgery type.

Setting—2 academic WLS centers in the United States.

Methods—We interviewed patients before and annually after WLS. High risk alcohol use as assessed via a modified version of the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C).

Results—Of 541 participants who underwent WLS, 375 (69% retention) completed the 1-year and 328 (63% retention) completed the 2-year interview. At 1 year, 13% reported high risk drinking compared to 17% at baseline, $p=0.10$; at Year 2, 13% reported high risk drinking compared to 15% at baseline, $p=0.39$; 7% and 6% of patients, respectively, reported new high risk drinking at 1- and 2-year follow-up. At both follow-up time points, more than half of those who reported high risk drinking at baseline no longer did so; A larger proportion of gastric bypass patients (71%) reported amelioration in high risk drinking than gastric banding (48%) at Year 1,

© 2014 American Society for Bariatric Surgery. Published by Elsevier Inc. All rights reserved.

Corresponding Author: Christina C. Wee, MD, MPH, Division of General Medicine and Primary Care, Beth Israel Deaconess Medical Center, 330 Brookline Ave, Boston, MA 02215, cwee@bidmc.harvard.edu, Tel: 617-754-1402, Fax: 617-754-1440.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

but this difference did not reach statistical significance ($p=0.07$); the difference largely dissipated by Year 2 (50% vs. 57%).

Conclusion—Although 7 % of patients report new high risk alcohol use 1 year after WLS, more than half who reported high risk alcohol use prior to surgery discontinued high risk drinking.

Keywords

bariatric surgery; Roux-Y Gastric Bypass; Gastric Banding; Alcohol

Introduction

Anecdotal and limited empiric data suggest a high prevalence of high risk drinking after bariatric or weight loss surgery (WLS)^[1–3]. Its mechanisms are poorly understood, but emerging evidence suggests that certain bariatric procedures produce an accelerated rate of absorption to alcohol.^[4–6] In prior studies, increased risk of high risk drinking post-WLS appeared to be primarily observed in patients who underwent gastric bypass but not gastric banding.^[7, 8] Physiologic studies by Woodard et al.^[4] suggest that patients who undergo gastric bypass have peak breath alcohol content after drinking a measured 5 oz alcohol dose that is higher at 3- and 6-months postoperatively than pre-operatively. Moreover, patients took longer to return to sobriety after alcohol intake. More recently, a similar study on 9 patients found no changes in peak alcohol content before or 3 months after gastric banding.^[9] Since these were separate studies where alcohol dosing was not BMI-adjusted, whether the difference in weight loss between the two procedures may have partially explained these differences is unclear. Others postulate an “addiction transfer” model to explain the high risk of alcohol misuse post-WLS, whereby obese individuals who might have used food as a coping mechanism substitute alcohol for food after WLS.^[4, 10]

Multiple early reports raised concerns that patients may be at an increased risk for developing an alcohol use disorder following weight loss surgery. ^[1, 2, 7, 8, 11] However, many of these early clinical studies had small sample size or very low retention rates, or more importantly did not assess alcohol use at baseline; thus, it was unclear whether disordered alcohol use after WLS was a new condition as opposed to pre-existing. ^[1, 2, 7, 8, 11] Perhaps the most robust clinical data to date come from the Longitudinal Assessment of Bariatric Surgery or LABS consortium,^[7] which assessed alcohol use systematically using a self-administered Alcohol Use Disorders Identification Test (AUDIT). The study found that alcohol use disorder symptoms were not increased at 1-year overall (7.6% vs. 7.3% at baseline) but were significantly higher at 2 years (9.6%, $p<0.01$). As with most prior studies, LABS focused on overall risk and did not report on reductions in alcohol misuse post-surgery, potentially missing positive effects that bariatric surgery may have on alcohol use. Overall risk of high risk drinking may be underestimated in studies that do not account for the possibility that a subset of patients may have resolution of their high risk drinking post-WLS. In a prior study, we found that 16% of patients seeking WLS reported high risk drinking and that higher risk drinkers were just as likely as non-high drinkers to proceed with WLS despite clinical screening for this behavior.^[12] Given the greater clinical attention being paid to caloric intake and substance abuse issues post-WLS,

we hypothesized that a subset of high risk drinkers who undergo WLS may actually experience amelioration of their high risk drinking.

In this context, we systematically characterized high risk alcohol drinking before and up to two years after bariatric surgery to examine the proportion of patients who developed high risk drinking and those whose high risk drinking behavior was ameliorated after WLS.

Methods

Study Sample and Data Collection

The Assessment of Bariatric Surgery (ABS) Study is a longitudinal cohort study of patients who were being evaluated for WLS to understand patient preferences and decision-making in the context of weight loss and WLS. Study subjects were systematically recruited from two academic WLS centers in Boston, Massachusetts, one of which serves a large racial minority and socially disadvantaged urban population. The two most commonly performed procedures at these centers during the recruitment period (2008–2011) were Roux-en-Y gastric bypass procedure and laparoscopic adjustable gastric banding. Eligible patients were aged 18 to 65 years at recruitment, spoke English, and whose physicians permitted us to contact them. Recruitment procedures have been described in detail elsewhere;^[12] the overall study participation rate was 70%. The study was approved by the institutional review boards at the respective study sites.

Participants underwent an hour-long telephone interview by trained interviews at baseline and annually after undergoing WLS. These interviews collected information about demographic and clinical factors as well as information about certain health behaviors including alcohol use. Quality of life (QOL) was assessed via the Impact of Weight on QOL-lite (IWQOL-lite), an 31-item validated obesity-specific QOL measure with reasonably good psychometric properties.^[13] These data were collected for research purposes only and were not part of the medical record or shared with clinical providers. A study nurse abstracted comorbid conditions from the medical record. Details of the data collection have been described previously.^[12, 14] Of 654 patients who participated, 541 underwent surgery. We previously reported the baseline alcohol use of the 654 patients seeking WLS.^[12] Our current study focuses only on patients who underwent WLS.

Alcohol Use and High Risk Drinking

We assessed alcohol use and high risk drinking at baseline and follow-up telephone interviews using a modified version of the Alcohol Use Disorder Identification Test-C or AUDIT-C.^[15] The Audit-C is a 3-item alcohol screen that identifies persons who are hazardous drinkers or have active alcohol use disorders. It is modified from the validated 10-item AUDIT questionnaire,^[16] but performs better in identifying heavy drinkers and performs comparably in identifying heavy drinkers and/or those with active alcohol use or dependence.^[15] The AUDIT-C assesses frequency of drinking over the past year, usual quantity of intake on a typical day, and binge drinking over the past year. We modified the third item to reflect binge drinking (5 drinks or more) in the previous month to improve accuracy in reporting in the context of a telephone interview and to be more consistent with

the definition of binge drinking set forth by the National Institutes of Alcohol Abuse and Alcoholism (<http://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/moderate-binge-drinking>). Patients who reported consumption of more than 1–2 drinks on a typical day or who reported at least one episode of binge drinking in the previous month were also asked a modified version of the remaining AUDIT items^[12, 16] related to alcohol dependency (impaired control over drinking, increased salience of drinking, and morning drinking) and harmful alcohol use (guilt after drinking, blackouts, alcohol-related injury, others concerned about drinking). Scores for the AUDIT-C range from 0–12. We defined high risk drinking as a score of >4 in men and >3 in women (since these scores have high sensitivity and specificity in identifying heavy drinking and/or active alcohol abuse or dependence) or an affirmative response to any of the follow-up items of alcohol dependency or harmful drinking. To maximize the reliability of responses, we assured patients that their responses would remain confidential and not reported back to their bariatric surgery clinical team who conducted their own routine clinical assessments for high risk drinking.

Data Analysis

We used descriptive statistics to characterize the prevalence of high risk alcohol drinkers at baseline and one and two years after WLS. We used Pearson chi-square tests to compare the proportion of new high risk drinkers at 1- and 2- years post-WLS relative to baseline and the proportion of high risk drinkers at baseline who no longer reported high risk drinking at follow-up between patients who underwent gastric bypass procedure and those who underwent gastric banding. Potential selection bias was examined by comparing the baseline characteristics of those who completed the baseline but not one-year or 2 year follow-up. All statistical analyses were conducted with SAS[®] (SAS[®] Institute, Cary, USA).

Results

Table 1 presents the baseline characteristics of study participants who underwent WLS compared to the baseline characteristics of those who completed the year 1 and year 2 follow-up. Of the 541 study participants who underwent surgery, 375 (69%) completed the 1-year follow-up interview. Non-respondents to the 1-year interview were significantly younger at baseline (mean age 41.1 ± 11.0 vs. 45.1 ± 11.7 years) and had a lower prevalence of gastroesophageal reflux disease and esophagitis (39% vs. 50%), but were otherwise similar in terms of sex, race, body mass index (BMI), surgery type, and other comorbidities. Of the 519 participants who reached their 2-year follow-up anniversary, 328 (63%) completed the 2-year interview. Non-respondents to the 2-year follow-up were significantly younger (age 41.5 vs. 45.3 years) but similar in other respects.

The overall prevalence of high risk drinking at baseline among subjects who underwent surgery in our study was 19% [95% Confidence Interval (CI), 16–23%]. Among subjects who completed the 1-year follow-up, the prevalence of high risk drinking was 17% (95% CI 13–21%) at baseline and 13% (95% CI 10–17%) at 1-year follow-up, $p=0.10$. Among those who completed the 2 year follow-up, high risk drinking was reported by 13% (95% CI 10–17%) compared to 15% (95% CI 11–19%) at baseline, $p=0.39$. Figures 1 and 2 display the proportion of participants who developed new high risk drinking and the proportion whose

high risk drinking ameliorated at follow-up relative to baseline. At both follow-up time points, more than half of patients who initially reported high risk drinking no longer did so. In contrast, 7% and 6% of patients, respectively, reported new high risk drinking one and two years post-WLS. These findings were similar between gastric bypass and gastric banding at both 1 and 2 years post-surgery (see Table 2). A higher proportion of gastric bypass than gastric banding patients reported amelioration of high risk drinking at Year 1 although this difference did not reach statistical significance ($p=0.07$); this difference was no longer evident by Year 2 suggesting that reductions in high risk drinking were more likely to be sustained among gastric banding patients.

Discussion

Approximately one out of six patients in our study who underwent bariatric or WLS reported high risk drinking at baseline. Interestingly, more than two-thirds of the gastric bypass and almost half of the gastric banding patients who reported high risk alcohol use behavior at baseline subsequently reported amelioration of this behavior 1 year after surgery; at two years, half of gastric bypass and more than half of gastric banding patients reported this improvement. Nevertheless, 7% of patients reported new high risk drinking at one year after WLS and 6% reported new high risk drinking two years later; this risk was comparable between gastric bypass and gastric banding patients.

Our findings are consistent with some of the findings from the LABS consortium in that there was not a discernible net increase in prevalence of high risk drinking 1 year post-surgery. After two years, the LABS consortium found a statistically significant increase in prevalence of disordered alcohol use of 9.6% vs. 7.3% whereas in our study, the prevalence was similar at baseline and 2 years post-surgery (14% vs. 15%). Our baseline prevalence of high risk drinking was also higher than the prevalence of disordered drinking in the LABS consortium. Some of these differences likely reflect our different populations and slight differences in how high risk drinking was assessed and defined. While participants in the LABS consortium were assured of confidentiality at the informed consent stage as in our study, participants in LABS were also informed that the investigators would take steps if there was concern for serious harm. This may have led to a larger proportion of patients who under-reported their high risk drinking in LABS as compared to our study. There is evidence to suggest that patients seeking bariatric surgery may under-report psychopathology when their responses will be used clinically as compared to during assessments conducted for research purposes only.^[17, 18]

Our study extends the findings from the LABS consortium by examining more closely the pattern of alcohol use among patients who reported high risk drinking before WLS and among those who did not. A small but notable minority of patients in our study report new high risk drinking one and two years post procedure. Interestingly, our findings also suggest that more bariatric patients report improvements in their pattern of alcohol intake than those who report worsening use. Whether this effect is durable remains to be seen. Moreover, it is important to note that almost half of baseline high risk drinkers still exhibit this high risk behavior post-surgery. Given the paradoxical impact WLS might have on different patients, it is important to try to identify factors associated with high risk drinking post-WLS.

We speculate that the immediate post-surgery period is a complex one where many patients reduce caloric intake, including from alcohol, not only because of the physiologic and clinical side effects from the procedure but also potentially because of the greater clinical focus on substance abuse concerns and dietary changes that has become standard post-surgery care at many bariatric centers. During the months before and after surgery, many bariatric centers may provide more intensive dietary intake counseling than what most obese patients will receive in the course of routine care otherwise. This more intensive counseling and monitoring may itself improve alcohol intake. However, other mechanisms may also be at play. A recent study compared alcohol-preferring rats who underwent the equivalent of Roux-en-Y gastric bypass (RYGB) to rats who underwent sham surgery. Both groups of rats were bred to prefer alcohol over regular chow and consumed the same amount of alcohol when presented with the substance prior to surgery; however, alcohol preferring rats who underwent RYGB reduced their alcohol consumption after surgery as compared to the sham surgery group.[3] The investigators also found suggestive evidence that this reduction in alcohol consumption in rats may be due to an elevation in GLP-1 levels after exposure to alcohol in rats who underwent RYGB and a reduction in Ghrelin levels; GLP-1 has been shown to be a taste aversive agent in rats whereas ghrelin levels appear to control alcohol consumption in rats. More recently, this same group of investigators conducted a similar study on rats that were not specifically bred to prefer alcohol.^[19] What they found was that rats who underwent RYGB in this study actually ingested more alcohol when offered the substance compared to those who underwent a sham control group, even after they controlled for pre-surgical body weight and diet. Whether these same postulated mechanisms in rats apply to humans is unclear but is consistent with our current findings that while some high risk drinkers reduce their intake of alcohol post-surgery, a subset of those who may not have a predilection for alcohol use manifested high risk drinking behavior post-RYGB.

In our study, we found the development of new high risk drinking to be comparable for both procedures. In contrast, gastric bypass appeared to have a more favorable effect on alcohol intake 1 year after WLS than gastric banding patients although the difference did not quite reach statistical significance. At the two year follow-up, however, the earlier apparent difference dissipated, suggesting the importance of longer term follow-up in trying to understand the full impact of WLS on alcohol use. These findings are in contrast to recent results from the Swedish Obese Subjects Study which found that inpatient admissions for alcohol abuse were twice as high for gastric bypass than for gastric banding patients post WLS.^[20] Whether the apparent positive effects on alcohol use observed in our study outweighs the potential adverse effect remains unclear. Clinicians should continue to caution about the potential harms, and future studies will need to identify strategies to minimize this risk.

Our results should be interpreted in the context of the study's limitations. Participants were recruited from only two centers in one geographic area; hence our findings may not generalize to other settings and populations. Moreover, 30% of patients seeking WLS did not participate in our study; the baseline rates of high risk drinking among nonparticipants might have been higher or otherwise different from our study participants. In addition, approximately one third did not complete follow-up. While the attrition rate was

substantially lower than in most other studies on alcohol intake post bariatric surgery,^[2, 21] it is slightly higher than those reported by the LABS consortium where follow-up data on alcohol use was missing in only 22% at the 1 year and 30% at the 2 year time-point. Moreover, high risk drinkers at baseline were less likely to complete follow-up than non-high risk drinkers. Nevertheless, even if we were to make the assumption that the high risk drinkers who did not follow-up were all still struggling with alcohol misuse, it would still suggest amelioration of high risk drinking in more than a third of baseline high risk drinkers at 1 year. Most of our data were self-reported by patients and there is likely reporting bias and under-reporting of undesirable outcomes such as excessive alcohol intake. Therefore, it is likely that our estimates of high risk drinking at all time-points are underestimated. We tried to minimize this bias by assuring patients that their responses would not be shared with their clinical providers unless patients so desired. Our baseline questionnaire elicited information about use and misuse in the previous year and not use in the remote past. Some of our “new” cases of high risk drinking may reflect relapse of prior alcohol abuse behavior. Finally, because of our modest sample size, we were underpowered to identify correlates of high risk drinking post-WLS.

Conclusion

In summary, we found that more than half of patients who reported high risk alcohol use behavior prior to bariatric surgery were more likely to report ceasing high risk drinking after surgery. In contrast, 7% reported new high risk drinking. The potential positive effects of undergoing bariatric surgery appear more durable in gastric banding patients compared to gastric bypass patients. Future studies should examine why WLS appears to ameliorate alcohol misuse in some patients, increase it in others, and how to best identify and minimize the risk of alcohol misuse after bariatric surgery.

References

1. Sogg S. Alcohol misuse after bariatric surgery: epiphenomenon or “Oprah” phenomenon? *Surg Obes Relat Dis.* 2007; 3:366–8. [PubMed: 17452022]
2. Suzuki J, Haimovici F, Chang G. Alcohol use disorders after bariatric surgery. *Obes Surg.* 2012; 22:201–7. [PubMed: 21188544]
3. Saules KK, Wiedemann A, Ivezaj V, Hopper JA, Foster-Hartsfield J, Schwarz D. Bariatric surgery history among substance abuse treatment patients: prevalence and associated features. *Surg Obes Relat Dis.* 2010; 6:615–21. [PubMed: 20207591]
4. Woodard GA, Downey J, Hernandez-Boussard T, Morton JM. Impaired alcohol metabolism after gastric bypass surgery: a case-crossover trial. *J Am Coll Surg.* 2011; 212:209–14. [PubMed: 21183366]
5. Maluenda F, Csendes A, De Aretxabala X, et al. Alcohol absorption modification after a laparoscopic sleeve gastrectomy due to obesity. *Obes Surg.* 2010; 20:744–8. [PubMed: 20358306]
6. Hagedorn JC, Encarnacion B, Brat GA, Morton JM. Does gastric bypass alter alcohol metabolism? *Surg Obes Relat Dis.* 2007; 3:543–8. discussion 548. [PubMed: 17903777]
7. King WC, Chen JY, Mitchell JE, et al. Prevalence of alcohol use disorders before and after bariatric surgery. *JAMA.* 2012; 307:2516–25. [PubMed: 22710289]
8. Odom J, Zalesin KC, Washington TL, et al. Behavioral predictors of weight regain after bariatric surgery. *Obes Surg.* 2010; 20:349–56. [PubMed: 19554382]

9. Changchien EM, Woodard GA, Hernandez-Boussard T, Morton JM. Normal alcohol metabolism after gastric banding and sleeve gastrectomy: a case-cross-over trial. *J Am Coll Surg*. 2012; 215:475–9. [PubMed: 22770864]
10. Heinberg LJ, Ashton K, Coughlin J. Alcohol and bariatric surgery: review and suggested recommendations for assessment and management. *Surg Obes Relat Dis*. 2012; 8:357–63. [PubMed: 22425058]
11. Dixon JB, Dixon ME, O'Brien PE. Pre-operative predictors of weight loss at 1-year after Lap-Band surgery. *Obes Surg*. 2001; 11:200–7. [PubMed: 11355027]
12. Kudsi OY, Huskey KW, Grove S, Blackburn GL, Jones DB, Wee CC. Pre-op alcohol abuse prevalence among weight loss surgery patients. *Surg Endosc*. 2013; 27:1093–7. [PubMed: 23052540]
13. Kolotkin RL, Crosby RD. Psychometric evaluation of the impact of weight on quality of life-lite questionnaire (IWQOL-lite) in a community sample. *Qual Life Res*. 2002; 11:157–71. [PubMed: 12018739]
14. Wee CC, Hamel MB, Apovian CM, et al. Expectations for weight loss and willingness to accept risk among patients seeking weight loss surgery. *JAMA Surg*. 2013; 148:264–71. [PubMed: 23553327]
15. Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. *Arch Intern Med*. 1998; 158:1789–95. [PubMed: 9738608]
16. Babor, TH-BJ.; Saunders, J.; Monteiro, M. D.o.M.H.a.S. Dependence, Editor. The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care. World Health Organization; 2001. p. 2-40.
17. Kalarchian MA, Wilson GT, Brolin RE, Bradley L. Assessment of eating disorders in bariatric surgery candidates: self-report questionnaire versus interview. *Int J Eat Disord*. 2000; 28:465–9. [PubMed: 11054796]
18. Mitchell JE, Steffen KJ, de Zwaan M, Ertelt TW, Marino JM, Mueller A. Congruence between clinical and research-based psychiatric assessment in bariatric surgical candidates. *Surg Obes Relat Dis*. 2010; 6:628–34. [PubMed: 20727837]
19. Ambwani S, Boeka AG, Brown JD, et al. Socially desirable responding by bariatric surgery candidates during psychological assessment. *Surg Obes Relat Dis*. 2013; 9:300–5. [PubMed: 21924688]
20. Lohr S. Sampling: Design and Analysis (Advanced Series). Brooks/Cole Cengage Learning. 2010
21. Ertelt TW, Mitchell JE, Lancaster K, Crosby RD, Steffen KJ, Marino JM. Alcohol abuse and dependence before and after bariatric surgery: a review of the literature and report of a new data set. *Surg Obes Relat Dis*. 2008; 4:647–50. [PubMed: 18420465]

Figure 1.
High risk alcohol use at 1-year followup relative to baseline, n=375

Figure 2.
High risk alcohol use at 2-year follow-up relative to baseline, n=328

Table 1

Characteristics of participants who underwent weight loss surgery and who completed interviews 1- and 2-years after surgery

	Underwent Surgery (n=541)	Completed 1-Year Interview (n=375)	Completed 2-Year Interview (n=328)
Age at baseline, mean (years)	43.9	45.1	45.4
Sex, %			
Male	24	25	23
Female	76	75	77
Race, %			
Caucasian	69	69	71
African American	17	17	17
Hispanic	11	9	10
Other	4	4	2
BMI at baseline, mean (kg/m ²) [*]	46.5	46.6	46.6
Education, %			
High school diploma or less	26	23	22
Some college, 2-year degree	36	34	36
4-year college or more	38	43	42
Surgery Type, %			
Lap band	44	45	46
Gastric bypass	55	54	52
Sleeve/other	1	1	1
Comorbid conditions, %			
Cardiac or peripheral vascular disease	6	7	7
Gastroesophageal reflux disease, esophagitis, Barrett's	46	50	50
Psychiatric or eating disorders	16	16	17
Liver disease, Cirrhosis	49	51	52
Stroke, Alzheimer's/Dementia	2	2	2
Cancer, leukemia, lymphoma, HIV	4	5	5
Baseline IWQOL-Lite, mean $\pm$ sd Overall summary score (0–100)	54 $\pm$ 20 [†]	55 $\pm$ 19 [‡]	56 $\pm$ 19 [§]

^{*} BMI refers to body mass index.

[†] 22 patients were missing values to complete this score.

[‡] 11 patients were missing values to complete this score.

[§] 9 patients were missing values to complete this score.

Table 2
Proportion of participants (95% CI) who developed new high risk drinking or whose high risk drinking dissipated after bariatric surgery

Surgery type and transitions in alcohol use status after bariatric surgery.*

	Gastric Bypass	Gastric Banding	P-value
Baseline			
High risk drinkers, %	14% (n=28/203)	20% (n=33/166)	0.12
1-year interview			
Non-high risk drinkers at baseline % developing new high risk drinking	7% (n=12/175)	9% (n=12/133)	0.52
Baseline high risk drinkers % no longer reporting high risk drinking	71% (n=20/28)	48% (16/33)	0.07
2-year interview			
Non-high risk drinkers at baseline % developing new high risk drinking	8% (n=13/153)	7% (n=8/120)	0.76
Baseline high risk drinkers % no longer reporting high risk drinking	50% (n=9/18)	57% (n=17/30)	0.64

* 6 patients who underwent procedures other than gastric bypass or banding were excluded from the comparisons presented in table 2