

# Effectiveness of Insurance-Mandated Bariatric Medically Supervised Weight-loss Programs

There are risks with any surgery, such as adverse reactions to medications, problems with anesthesia, problems breathing, bleeding, blood clots, inadvertent injury to nearby organs and blood vessels, even death. Bariatric surgery has its own risks, including failure to lose weight, nutritional or vitamin deficiencies, and weight regain. Patients should consult their physicians to determine if this procedure is appropriate for their condition.

## Background and opportunity

Bariatric surgery has proved to be the most effective treatment resulting in significant and durable weight loss. Many US insurers require bariatric surgery candidates complete medically supervised diets consisting of consecutive weight management programming or visits, with some providers requiring mandated presurgical weight loss before surgery approval.

There is no preponderance of evidence that participation in medically supervised weight loss (MSWL) programs reduce perioperative surgical complications and provide superior postoperative outcomes. The more recent multi-society-endorsed professional guideline (AACE/TOS/ASMBS/OMA/ASA 2019 Guidelines: Preoperative care) as well as the 2020 Obesity Action Coalition (OAC) position statement, do not support use of mandated weight-loss programs before bariatric surgery; rather, they strongly recommend and advocate for greater access through insurance plan coverage with no prerequisites. Enforcing strict insurance-mandated weight management programs (WMPs) can contribute to patient attrition and curb patient access (Flanagan 2016, ASMBS Position statement 2016).

Three salient review publications provide a well-documented summary of evidence. A meta-analysis by Roman et al (2019) of 16 studies with 6,060 participants found that preoperative weight loss interventions have no effect on perioperative bleeding, myocardial infarction, pulmonary embolism, infection rate, preoperative correction of comorbidities, reoperation rate, or overall complications. Similarly, an earlier systematic review by Ochner et al. (2012) includes 20 studies, which also concluded that insurance-mandated preoperative requirements are ineffective in fostering postoperative weight loss. Studies outlined in a review by the 2015 health technology assessment ICER organization also echo that pre-operative requirements do not lead to adherence to postoperative weight loss management lifestyle changes (2015).

There is a growing trend among leading payers of revisiting the pre-operative evaluation in bariatric surgery policies that are more aligned with patient-centered, physician-directed care by reducing specific presurgical weight loss requirements (United Healthcare, Cigna, BCBS North Carolina changed policies in 2019 removed the language around MSWL requirements).

**The summary of evidence coupled with the pre-operative care multi-society guideline 2019 and the recent OAC patient advocacy society position, as well as payer direction increasingly lowering insurance-mandated presurgical weight loss requirements, demonstrate lack of effectiveness of mandatory preoperative weight loss programs in improving long-term outcomes with bariatric surgery.**



## Guidelines status

Clinical guidelines and position statements published by specialty societies recommend pre-procedure evaluations in order to best prepare surgical candidates for the procedure; however, these programs are intended to include weight loss components on a patient-by-patient basis only.

	<b>AACE/TOS/ ASMBS/OMA/ASA 2019 Guidelines:</b> Preoperative care	<b>ASMBS (2016):</b> Presurgical psychosocial evaluation	<b>ASMBS (2016):</b> Insurance-mandated preoperative weight loss position statement	<b>OAC Position Statement (2020)</b>
<b>Landscape</b>	Evidence and expert opinions support the completion of a pre-procedure evaluation for obesity-related complications and causes of obesity that include medical history, psychosocial history, physical examination, and appropriate lab testing	Evidence supports that psychological factors have significant potential to affect long term post-surgical outcomes, including emotional adjustment, adherence to the recommended postoperative lifestyle regimen, weight loss outcomes, and co-morbidity improvement and/or resolution	There were no Level I studies or evidence-based reports that documented any benefit or need for a 3-18 month insurance-mandated preoperative dietary weight loss program before bariatric surgery	Obesity is a complex, multifactorial, and chronic disease that requires a comprehensive medical approach to care. It is the second leading preventable cause of death in the U.S., and is associated with a large number of co-morbid conditions
<b>Recommendations</b>	Guidelines strongly recommend preoperative evaluations and only note that preoperative weight loss may be recommended in selective situations (i.e. reduce liver volume to improve technical aspects of surgery)	The involvement of a behavioral health clinician before and after weight loss surgery can improve adherence to postoperative diet and lifestyle regimens, which can lead to better postoperative outcomes	Weight loss programs are scientifically unfounded and patients seeking surgical treatment for obesity should be evaluated based on initial BMI and co-morbid conditions. The provider is best able to determine what constitutes failed weight loss	Health insurance should cover care for obesity as a standard benefit as well as necessary long-term follow-up care for obesity treatment. Access to care should not require undue tests or prerequisites on the part of the patient

Physicians are best equipped to determine the appropriate components of a pre-surgical program for their own patients, taking into account technical aspects, patient behavioral and mental health needs, as well as medical history.

## Payer activity

There is a growing trend from leading payers in revisiting the pre-operative evaluation in bariatric surgery policies more aligned with patient-centered, physician-directed care by reducing specific weight loss requirements.\*

	National Impact		Regional Impact	
	United Healthcare <sup>1</sup>	Cigna <sup>2</sup>	BCBS NC <sup>3</sup>	HCSC <sup>4,5</sup>
<b>Language Around Patient Eligibility for Bariatric Surgery</b>	Adults must complete both preoperative evaluation that includes a detailed weight history along with dietary and physical activity patterns as well as a psychological- behavioral evaluation in order to identify risk factors or potential postoperative challenges that may contribute to poor outcomes	Patients must receive a statement from a licensed provider noting that the individual has failed previous attempts to achieve weight loss by medical management as well as the completion of a thorough multidisciplinary evaluation within 6 months prior to surgery	Patients must receive a statement from a licensed provider noting that the individual has failed previous attempts to achieve weight loss by medical management as well as the completion of a thorough multidisciplinary evaluation within 6 months prior to surgery	Compliance with dietary and weight loss regimens as well as a psychological evaluation of patients' ability to understand and comply with pre and postoperative recommendations within 12 months preceding the request for surgery
<b>Recent Payer Activity</b>	Effective 11/2019: Removed language around the involvement in a structured diet/ weight loss program for at least 6 months prior to surgery	Effective 7/1/2018: removed language around a requirement for active participation in a physician supervised weight-management program for at least 3 consecutive months within 12 months prior to surgery	Effective 11/2019: Removed language around a requirement for one year of conservative medical management prior to bariatric surgery	Effective 2/2012: Removed language around the requirement for a presurgical program for at least 6 months, occurring within 24 months prior to surgery
<b>Takeaway</b>	United Healthcare's policy requires preoperative evaluations but does not mention any requirements for preoperative weight loss	Cigna's policy requires a statement from a provider noting an individual's failed attempts at weight loss but does not specify the requirement to be enrolled in a mandated weight loss program	BCBS of NC's policy requires preoperative evaluations and education noting that the nutritional evaluation must be completed within 12 months prior to surgery but there is no mention of a requirement for preoperative weight loss	HCSC's policy notes a requirement for an individual to comply with preoperative and postoperative treatment plans but does not specify any preoperative requirements, leaving to the discretion of the treating physicians
<b>Lives Impacted</b>	>27.5 Million	>125 Million	>2 Million	>15.5 Million

\*Policies remain unchanged from 2020-2021.

1. Policy Link: <https://www.uhcprovider.com/content/dam/provider/docs/public/policies/comm-medical-drug/bariatric-surgery.pdf> 2. Policy Link: [https://static.cigna.com/assets/chcp/pdf/coveragePolicies/-medical/mm\\_0051\\_coveragepositioncriteria\\_bariatric\\_surgery.pdf](https://static.cigna.com/assets/chcp/pdf/coveragePolicies/-medical/mm_0051_coveragepositioncriteria_bariatric_surgery.pdf) 3. Policy Link: [https://www.bluecrossnc.com/sites/default/files/document/attachment/services/public/pdfs/medicalpolicy/bariatric\\_surgery.pdf](https://www.bluecrossnc.com/sites/default/files/document/attachment/services/public/pdfs/medicalpolicy/bariatric_surgery.pdf) 4. Policy Link: <http://www.medicalpolicy.hcsc.net/medicalpolicy/activePolicy/Page?lid=jnyvd60w&corpEntCd=TX1> 5. HCSC includes: BCBS of TX, BCBS of IL, BCBS of OK, BCBS of MT, BCBS of NM

## Call to action

A growing body of clinical evidence demonstrates that mandated pre-surgical diet requirements have minimal effect on perioperative and long-term clinical outcomes and may, in some cases, reduce the effectiveness of surgery. Insurance-mandated preoperative weight loss programs must be removed in order to deliver better, more equitable, and timely care to patients. Based on this and a lack of support for insurer-mandated requirements in clinical guidelines, we ask that commercial insurers to revise their approach to pre-surgical programs in order to:

- Recognize that physician-directed, patient-centered care provides patients with the best opportunity for long-term success, and that inflexible pre-surgical requirements do not accomplish their stated goals
- Commit to improving access for patients by reducing or eliminating pre-surgical program requirements; in particular, removing requirements that bariatric surgery patients lose weight in the months prior to surgery

# Appendix

## Detailed Evidence Findings

### Two studies addressed the context of the discussion rather than outcomes findings

Of the 37 articles comprising 10,406 patients, 26 studies were identified from the three salient studies (Roman et al 2019, ICER 2015, and Ochner et al 2012), which provided the majority of summary of evidence. Additionally, 11 studies were identified using a structured search strategy to demonstrate the most recent literature.

**A meta-analysis by Roman et al. (2019) of 16 studies with 6,060 participants found that preoperative weight loss interventions have no effect on perioperative bleeding, myocardial infarction, pulmonary embolism, infection rate, preoperative correction of comorbidities, reoperation rate, or overall complications. Articles reviewed by Roman et al include:**

- In 121 O-LRYGB patients with 24 months of follow-up, Fujioka et al. (2008) reported that patients with preoperative weight loss had no significant difference in postoperative EWL or perioperative complications compared to those without preoperative weight loss or weight gain
- Harnisch et al. (2008) showed in 1629 LRYGB patients with a 12-month follow-up that pre-operative weight gain/loss is not differentially associated with perioperative complications, EWL post-surgery, or the resolution of comorbidities post-surgery
- In a study by Huerta et al (2008), 40 RYGB patients with 24 months of follow-up showed that pre-operative weight loss is associated with shorter operative time but not EWL or perioperative complication rates at a 2 year follow up
- A study by Jamal et al. (2006) showed in 324 O-LRYGB patients with 24 months of follow-up that insurance-mandated preoperative dietary counseling has no impact on long-term weight loss or postsurgical compliance and is a significant obstacle to patient access
- In 95 LRYGB patients with 3 months of follow-up, Liu et al. (2005) showed that, at 3 months, pre-operative weight loss was associated with less intra-operative blood loss but was not associated differences in operative time, length of hospital stay, rate of wound infections, or major complications
- Martin et al. (1995) showed in 100 ORYGB patients that pre-operative dieters and non-dieters had similar rates of post-operative morbidity. No differences in wound healing complications were identified
- Parikh et al. (2012) showed in a single-center RCT that showed in 55 LAGB patients with 24 months of follow-up that pre-operative medically supervised weight management is not associated with post-operative weight loss or behavioral outcomes
- In a retrospective cohort study of 353 LRYGB patients with 42 months of follow-up, Riess et al. (2008) showed that preoperative weight loss does not decrease operative time, hospital length of stay, mean or percentage EWL at 1 year; however, it is associated with fewer net complications ( $P=0.035$ )

**A 2015 review conducted by ICER did not make a summary statement about the impact of preoperative weight loss programs on outcomes; however, studies reviewed by ICER did not demonstrate significant impacts. Articles not reviewed by Roman et al included:**

- A study by Becouarn et al. (2010) showed in 539 RYGB or LAGB or VSG patients with 4 years of follow-up that preoperative weight loss is not associated with postoperative weight loss
- Lier et al. (2012) showed in 141 RYGB patients with 2 months of follow-up that pre-surgical counseling is not associated with treatment adherence to lifestyle changes

**An early systematic review by Ochner et al. (2012) includes 20 studies not covered by either the ICER or Roman review. The review concluded that insurance-mandated pre-operative requirements are ineffective in fostering postoperative weight loss.**

- Carlin et al. (2008) showed in 295 LYRGB patients with 1 year of follow-up that there is no relationship between pre-operative % change in total body weight and post-operative % excess body weight lost at 1-year follow-up
- Eisenberg et. al (2010) showed in 256 LRYGB patients with 1 year of follow-up that there was no significant difference in % BMI loss between patients who lost weight preoperative versus those who maintained or gained weight. Furthermore, percent change in BMI preoperatively did not predict postoperative BMI change after 1 year
- A 2011 study by Kuwada et al of 440 RYGB patients with 12 months of follow-up showed that patients who underwent a standardized mandated medical program had a significant delay in TTS and did not experience significant pre or post-operative weight loss benefits. There was also no significant preoperative excess weight loss or postoperative weight loss for patients with a mandated medical program pre-surgery versus those without
- Ochner et al, 2010 showed in 153 patients with 6 months of follow-up that insurance mandated weight loss regimens were ineffective in producing preoperative weight loss
- Phan, 2005 showed in 364 RYGB patients with 1 year of follow-up that there was no significant difference in weight loss, %EBW loss, or BMI postoperatively between patients who lost weight preoperatively versus those that did not
- Taylor et al, 1995 showed in 76 VBG patients with 1 year of follow-up that preoperative weight gain is not predictive of lesser postoperative weight loss for patients undergoing bariatric surgery for morbid obesity

**Each of the 37 studies were categorized into three divisions: 20 studies that support removal of pre-surgical weight loss requirements, 7 studies with inconsistent findings with regard to pre-surgical weight loss requirements, and 8 studies with findings that support the use of pre-surgical weight loss requirements**

Among the 20 studies with findings that support the removal of pre-surgical weight loss requirements:

- Tan et al. (2020) found in 306 SG or GB patients prescribed a very low calorie diet for 14 days preoperatively that there was no significant difference in complication rate, duration of surgery, or length of stay, regardless of surgery type, and no difference in TWL and Excess Body Mass Index Loss (%EBMIL) beyond 6 months in patients with WL <5% than patients with >5% WL
- A 2019 study by Eng et al. of 415 LRYGB or GB patients with a 2-year follow-up showed a negative correlation between TTS and preoperative percentage of TWL. No significant difference in rates of complications or readmissions were identified
- Keith et al. (2018) showed in 284 LRYGB patients with a 24-month follow-up that there was no difference in length of stay and complication rates for patients with vs without an insurance-mandated pre-operative diet
- In a retrospective, multi-center study of 354 RYGB or VSG with a follow-up of 12 months, Schneider et al. (2018) showed that there was no significant benefit to rate of readmission, reoperation, follow-up, or % EWL up to 12 months post-operation in patients who participated in a WMP with preoperative diet. The authors further suggest that undergoing bariatric surgery without completing an insurance-mandated WMP is safe and effective

**Among the 7 studies with inconsistent findings with regard to pre-surgical weight loss requirements:**

- A study by Albanese et al. (2019) in 178 laparoscopic sleeve gastrectomy (LSG) patients demonstrated that 3 weeks of a very-low-calorie ketogenic diet (VLCKD) showed better results than very low-calorie diet (VLCD) on surgical outcome, influencing drainage output, post-operative hemoglobin levels, and hospital stay but did not compare against patients without pre-surgical weight loss programs
- A retrospective study of 239 LRYGB patients with 24 months follow-up by Kraus et al. (2018) demonstrated that patients successfully undergoing a preoperative diet also lose more weight postoperatively; however, the model was most predictive in the 4-6 months immediately following surgery, with diminishing effect at 24 months

- Pratt et al. (2018) carried out a retrospective medical record analysis in 497 patients undergoing RYGB and SG with 6- and/or 12-month postoperative follow-ups to show that patients attending the WMP had better 12-month %EWL and outcomes compared with those who did not; though this was not true for 6-month outcomes and differed based on surgery type and findings were not statistically significant in the overall population
- Van Nieuwenhove et al. (2011) showed in 273 LRYGB patients with 18 months of follow-up that pre-operative diet was not associated with differences in operating time or intraoperative complications. The pre-operative diet group, however experienced fewer 30-day complications
- Alami et al. (2007) performed a prospective randomized trial of 61 patients undergoing LRYGB surgery at a one-year follow-up. Of the 61 patients, data was available for 12 at a one-year follow-up. Preoperative weight loss before LRYGB was found to be associated with a decrease in the operating room time ( $p=0.0084$ ) and an improved %EWL in the short term ( $p=0.0267$ ); however, there was no significant impact on complication rate, resolution of comorbidities, or conversion rates; therefore, long-term effects could not be determined
- Mrad et al, 2007 showed in 146 VBG or OGB or LGB or LAGB patients with 3 months of follow-up that postoperative weight loss was not influenced by preoperative weight change among women. However, men who gained weight preoperatively had significantly worse outcomes
- A 2007 study by Still et al. reported in 884 O-LRYGB patients with 45 months of follow-up that patients who achieved loss of 5%-10% excess body weight prior to surgical intervention were more likely to achieve rapid post-surgical weight loss and shorter length of hospital stay; however, only 48% of patients were successful in achieving the 10% loss of excess body weight during the study period

**Among the 8 studies with findings that support the use of pre-surgical weight loss requirements:**

- Fennig et al. (2019) found in 48 LSG patients undergoing 3-month pre-surgical outpatient intervention and a 6-month post-surgical follow-up that moderate weight loss in a pre-surgical lifestyle-oriented intervention program predicts optimal post-surgical weight loss
- Patel et al. (2015) demonstrated in 110 RYGB patients with 12 months of follow-up that patients who received intervention with a 6-month weight loss program prior to RYGB lost significantly more weight at 6 and 12 months post-operatively than patients who did not receive the intervention
- Junior et al. (2011) demonstrated in 149 RYGB patients with up to 4 years of follow-up that preoperative weight loss was associated with lower EWL 2 and 3 years after surgery
- A prospective cohort study by Huerta et al. (2010) showed in 5 super obese patients that massive preoperative weight loss is possible to achieve with a liquid protein diet which greatly eases bypass surgery in an otherwise high-risk patient population
- In a retrospective cohort study of 881 LRYGB patients, Benotti et al. (2009) demonstrated that patients who achieved greater excess body weight loss percentage experienced fewer complications
- Alger-Mayer et al. (2008) showed in 150 RYGB patients with 4 years of follow-up that there is a correlation between preoperative weight loss and sustained weight loss at 3 and 4 years
- A 2007 retrospective study of 351 LRYGB patients with 6 months of follow-up by Ali et al. demonstrated that patients who pre-operatively lost weight showed greater excess weight loss and BMI change
- Alvarado et al., (2007) showed in 90 LYRYGB patients with 13 months of follow-up that preoperative weight loss resulted in greater postoperative weight loss at 1 year and resulted in shorter operating times. Preoperative weight loss did not correlate with postoperative complications

## Pre-surgical weight loss has no impact or negatively impacts this outcome (+)

### Support removal of pre-surgical weight loss requirements

Citation	Author/Year	Procedure	Intervention	Study Type	No. of Patients/ Duration Follow-up		Outcomes
Becouarn G, Topart P, Ritz P. Weight loss prior to bariatric surgery is not a pre-requisite of excess weight loss outcomes in obese patients. <i>Obes Surg.</i> 2010;20(5):574-577. doi:10.1007/s11695-010-0083-5.	Becouarn, 2010	RYGB or LAGB or VSG	Degree of preoperative weight loss	Retrospective, cohort study, single center, single surgeon	539	4 years	A study by Becouarn et al. (2010) showed in 539 RYGB or LAGB or VSG patients with 4 years of follow-up that preoperative weight loss is not associated with postoperative weight loss
Carlin AM, O'Connor EA, Genaw JA, Kawar S. Preoperative weight loss is not a predictor of postoperative weight loss after Roux-en-Y gastric bypass. <i>Surg Obes Relat Dis.</i> 2008; 4:481-485.	Carlin, 2008	LYRGB	Routine preoperative weight loss goals set by a nutritional and exercise program	Retrospective cohort	295	1 year	Carlin et al. (2008) showed in 295 LYRGB patients with 1 year of follow-up that there is no relationship between pre-operative % change in total body weight and post-operative % excess body weight lost at 1-year follow-up
Eisenberg D, Duffy A, Bell R. Does preoperative weight change predict postoperative weight loss after laparoscopic Roux-en-Y gastric bypass in the short term? <i>J Obes</i> 2010.	Eisenberg, 2010	LRYGB	Preoperative BMI change	Retrospective cohort	256	1 year	Eisenberg et al. (2010) showed in 256 LRYGB patients with 1 year of follow-up that there was no significant difference in % BMI loss between patients who lost weight preoperative versus those who maintained or gained weight. Furthermore, percent change in BMI preoperatively did not predict postoperative BMI change after 1 year
Eng V, Garcia L, Khoury H, Morton J, Azagury D. Preoperative weight loss: is waiting longer before bariatric surgery more effective? <i>Surg Obes Relat Dis.</i> 2019; 15(6):951-957. doi: 10.1016/j.soard.2019.03.012. Epub 2019 Mar 20.	Eng, 2019	Laparoscopic Roux-en-Y gastric bypass (LRYGB) or gastric bypass (GB)	Preoperative wait time	Retrospective, single-center	415	2 years	A 2019 study by Eng et al. of 415 LRYGB or GB patients with a 2-year follow-up showed a negative correlation between Time to Surgery (TTS) and preoperative percentage of Total Weight Loss (TWL). No significant difference in rates of complications or readmissions were identified
Fujioka K, Yan E, Wang HJ, Li Z. Evaluating preoperative weight loss, binge eating disorder, and sexual abuse history on Roux-en-Y gastric bypass outcome. <i>Surg Obes Relat Dis.</i> 2008;4(2):137-143. doi:10.1016/j.soard.2008.01.005.	Fujioka et al, 2008	O-LRYGB	Preoperative weight loss, binge eating disorder (BED), and sexual abuse history	Retrospective, Cohort Study, Single centre	121	71 months	In 121 O-LRYGB patients with 24 months of follow-up, Fujioka et al. (2008) reported that patients with preoperative weight loss had no significant difference in postoperative EWL or perioperative complications compared to those without preoperative weight loss or weight gain
Harnisch MC, Portenier DD, Pryor AD, Prince-Petersen R, Grant JP, DeMaria EJ. Preoperative weight gain does not predict failure of weight loss or co-morbidity resolution of laparoscopic Roux-en-Y gastric bypass for morbid obesity. <i>Surg Obes Relat Dis.</i> 2008;4(3):445-450. doi:10.1016/j.soard.2007.09.016.	Harnisch, 2008	RYGB	Preoperative weight gain/loss	Retrospective, Cohort Study, Single centre	1629	2 years	Harnisch et al. (2008) showed in 1629 LRYGB patients with a 12-month follow-up that pre-operative weight gain/loss is not differentially associated with perioperative complications, EWL post-surgery, or the resolution of comorbidities post-surgery. The operative time was slightly longer for the preoperative weight loss group
Huerta S, Dredar S, Hayden E, et al. Preoperative weight loss decreases the operative time of gastric bypass at a Veterans Administration hospital. <i>Obes Surg.</i> 2008;18(5):508-512. doi:10.1007/s11695-007-9334-5.	Huerta 2008	RYGB	Preoperative weight loss within 3 months	Retrospective, Cohort study, Single centre, single surgeon	40	2 years	In a study by Huerta et al. (2008), 40 RYGB patients with 24 months of follow-up showed that pre-operative weight loss is associated with shorter operative time but not EWL or perioperative complication rates at a 2 year follow up

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### Support removal of pre-surgical weight loss requirements

Citation	Author/Year	Procedure	Intervention	Study Type	No. of Patients/ Duration Follow-up		Outcomes
Jamal MK, DeMaria EJ, Johnson JM, et al. Insurance-mandated preoperative dietary counseling does not improve outcome and increases dropout rates in patients considering gastric bypass surgery for morbid obesity. <i>Surg Obes Relat Dis.</i> 2006;2(2):122-127. doi:10.1016/j.soard.2006.01.009.	Jamal et al, 2006	O-LRYGB	Insurance-mandated preoperative dietary counseling	Prospective, Cohort Study, Single centre	324	35 months	A study by Jamal et al. (2006) showed in 324 O-LRYGB patients with 24 months of follow-up that insurance-mandated preoperative dietary counseling has no impact on long-term weight loss or postsurgical compliance and is a significant obstacle to patient access. Resolution of major comorbidities, complication rates, 30-day postoperative mortality, and postoperative compliance with follow-up were similar
Keith CJ Jr, Goss LE, Blackledge CD, Stahl RD, Grams J. Insurance-mandated preoperative diet and outcomes after bariatric surgery. <i>Surg Obes Relat Dis.</i> 2018; 14(5):631-636. doi: 10.1016/j.soard.2018.01.017. Epub 2018 Feb 2.	Keith, 2018	LRYGB	Insurance-mandated preoperative diet	Retrospective, cohort, single-center	284	24 months	- Length of stay, no impact - Complication rates - no impact % WL or % EWL - negative impact
Kuwada TS, Richardson S, Chaar ME, et al. Insurance mandated medical programs before bariatric surgery: do good things come to those who wait? <i>Surg Obesity Rel Dis</i> 2011;7: 526-530.	Kuwada et al, 2011	RYGB	Mandated medical program (MMP)	Prospective, Cohort Study, Multi-centre	440	12 months	A 2011 study by Kuwada et al of 440 RYGB patients with 12 months of follow-up showed that patients who underwent a standardized mandated medical program had a significant delay in TTS and did not experience significant pre- or post-operative weight loss benefits. There was also no significant preoperative excess weight loss or postoperative weight loss for patients with a mandated medical program pre-surgery versus those without
Lier HØ, Biringer E, Stubhaug B, Tangen T. The impact of preoperative counseling on postoperative treatment adherence in bariatric surgery patients: a randomized controlled trial. <i>Patient Educ Couns.</i> 2012;87(3):336-342. doi:10.1016/j.pec.2011.09.014.	Lier 2012	RYGB	Preoperative counseling program	RCT	141	2 months	Lier et al. (2012) showed in 141 RYGB patients with 2 months of follow-up that pre-surgical counseling is not associated with treatment adherence to lifestyle changes
Liu RC, Sabnis AA, Forsyth C, Chand B. The effects of acute preoperative weight loss on laparoscopic Roux-en-Y gastric bypass. <i>Obes Surg.</i> 2005;15(10):1396-1402. doi:10.1381/096089205774859155.	Liu et al, 2005	LRYGB	Preoperative weight loss	Retrospective, Cohort study, Single centre	95	20 months	In 95 LRYGB patients with 3 months of follow-up, Liu et al. (2005) showed that, at 3 months, pre-operative weight loss was associated with less intra-operative blood loss but was not associated differences in operative time, length of hospital stay, rate of wound infections, or major complications
Martin LF, Tan TL, Holmes PA, Becker DA, Horn J, Bixler EO. Can morbidly obese patients safely lose weight preoperatively? <i>Am J Surg.</i> 1995;169(2):245-253. doi:10.1016/s0002-9610(99)80145-7.	Martin et al, 1995	ORYGB	Preoperative dieters	Prospective, Cohort Study, Single centre	100	53 months	Martin et al. (1995) showed in 100 ORYGB patients that pre-operative dieters and non-dieters had similar rates of post-operative morbidity. No differences in wound healing complications were identified

## Pre-surgical weight loss has no impact or negatively impacts this outcome (+)

### Support removal of pre-surgical weight loss requirements

Citation	Author/Year	Procedure	Intervention	Study Type	No. of Patients/ Duration Follow-up		Outcomes
Parikh M, Dasari M, McMacken M, Ren C, Fielding G, Ogedegbe G. Does a preoperative medically supervised weight loss program improve bariatric surgery outcomes? A pilot randomized study. <i>Surg Endosc.</i> 2012;26(3):853-861. doi:10.1007/s00464-011-1966-9.	Parikh 2012	LAGB	6-month medically supervised	RCT, single centre	55	6 months	Parikh et al. (2012) showed in a single-center RCT that showed in 55 LAGB patients with 6 months of follow-up that pre-operative medically supervised weight management is not associated with post-operative weight loss or behavioral outcomes  Demographics, weight, and patient behavior scores, including patient adherence, eating behavior, patient activation, and physical activity, were collected at baseline and at 6 months (immediately preoperatively and postoperatively)
Phan DC, Flanders KM, Sanford L, Shah PC, Brams DM. Preoperative weight loss improves outcome after bariatric surgery. <i>Surg Obes Relat Dis</i> 2005;1:282 (abstract 106).	Phan, 2005	RYGB	Preoperative weight change	Retrospective cohort	364	1 year	Phan, 2005 showed in 364 RYGB patients with 1 year of follow-up that there was no significant difference in weight loss, %EBW loss, or BMI postoperatively between patients who lost weight preoperatively versus those that did not
Riess KP, Baker MT, Lambert PJ, Mathiason MA, Kothari SN. Effect of preoperative weight loss on laparoscopic gastric bypass outcomes. <i>Surg Obes Relat Dis.</i> 2008;4(6):704-708. doi:10.1016/j.soard.2008.05.007.	Riess et al, 2008	LRYGB	Preoperative weight loss requirement	Retrospective cohort	353	42 months	In a retrospective cohort study of 353 LRYGB patients with 42 months of follow-up, Riess et al. (2008) showed that preoperative weight loss does not decrease operative time, hospital length of stay, mean or percentage EWL at 1 year; however, it is associated with fewer net complications (p=0.035)
Schneider A, Hutcheon DA, Hale A, Ewing JA, Miller M, Scott JD. Postoperative outcomes in bariatric surgical patients participating in an insurance-mandated preoperative weight management program. <i>Surg Obes Relat Dis.</i> 2018; 14(5):623-630. doi: 10.1016/j.soard.2018.01.036. Epub 2018 Feb 2.	Schneider, 2018	VSG or RYGB	Medically supervised weight management program (WMP) before offering approval for bariatric surgery	Retrospective, cohort, multi-center	354	12 months	No significant benefit to rate of readmission, reoperation, follow-up, or % EWL up to 12 months post-operation in patients
Taylor EL, Chiasson PM, Perey BJ. Predicting bariatric surgical outcomes: does preoperative weight gain correlate with less postoperative weight loss? <i>Obes Surg</i> 1995;5:375-377	Taylor, 1995	VBG	No significant weight gain postoperatively	Retrospective	76	1 year	Taylor et al, 1995 showed in 76 VBG patients with 1 year of follow-up that preoperative weight gain is not predictive of lesser postoperative weight loss for patients undergoing bariatric surgery for morbid obesity

## Pre-surgical weight loss impacts this outcome but only for certain populations (mixed)

### Article conclusions support use of pre-surgical weight loss requirement

Citation	Author/Year	Procedure	Intervention	Study Type	No. of Patients/ Duration Follow-up		Outcomes
Alger-Mayer S, Polimeni JM, Malone M. Preoperative weight loss as a predictor of long-term success following Roux-en-Y gastric bypass. <i>Obes Surg</i> 2008; 18:772-775.	Alger-Mayer et al, 2008	RYGB	10% total body weight (TBW) loss prior to surgery	Prospective, Cohort Study, Single centre	150	4 years	Alger-Mayer et al. (2008) showed in 150 RYGB patients with 4 years of follow-up that there is a correlation between preoperative weight loss and sustained weight loss at 3 and 4 years
Ali MR, Baucom-Pro S, Broderick-Villa GA, Campbell JB, Rasmussen JJ, Weston AN et al. Weight loss before gastric bypass: feasibility and effect on postoperative weight loss and weight loss maintenance. <i>Surg Obes Relat Dis</i> 2007;3: 515-520.	Ali et al, 2007	LRYGB	Preoperative weight loss	Retrospective, Cohort Study, Single Centre	351	6 months	A 2007 retrospective study of 351 LRYGB patients with 6 months of follow-up by Ali et al. demonstrated that patients who pre-operatively lost weight showed greater excess weight loss and BMI change
Alvarado R, Alami RS, Hsu G, et al. The impact of preoperative weight loss in patients undergoing laparoscopic Roux-en-Y gastric bypass. <i>Obes Surg</i> 2005;15: 1282-1286.	Alvarado et al, 2007	LRYGB	Policy of postoperative weight loss	Retrospective, Cohort Study, Single Centre	90	13 months	Alvarado et al. (2007) showed in 90 LRYGB patients with 13 months of follow-up that preoperative weight loss resulted in greater postoperative weight loss at 1 year and resulted in shorter operating times. Preoperative weight loss did not correlate with postoperative complications
Benotti PN, Still CD, Wood GC, et al. Preoperative weight loss before bariatric surgery. <i>Arch Surg</i> 2009; 144: 1150-1155.	Benotti, 2009	LRYGB	6-month multidisciplinary program that encouraged a 10% preoperative weight loss	Retrospective cohort	881	None (in-surgery analysis only)	In a retrospective cohort study of 881 LRYGB patients, Benotti et al. (2009) demonstrated that patients who achieved greater excess body weight loss percentage experienced fewer complications
Fennig U, Snir A, Halifa-Kurzman I, Sela A, Hadas A, Fennig S. Pre-surgical weight loss predicts post-surgical weight loss trajectories in adolescents enrolled in a bariatric program. <i>Obes Surg</i> . 2019;29(4):1154-1163. doi: 10.1007/s11695-018-03649-8.	Fennig, 2019	Laparoscopic sleeve gastrectomy (LSG)	3-month pre-surgical outpatient intervention	Prospective, single-center	48	3-month pre-surgical outpatient intervention and a 6-month post-surgical follow-up	Fennig et al. (2019) found in 48 LSG patients undergoing 3-month pre-surgical outpatient intervention and a 6-month post-surgical follow-up that moderate weight loss in a pre-surgical lifestyle-oriented intervention program predicts optimal post-surgical weight loss
Huerta S, Li Z, Anthony T, Livingston EH. Feasibility of a supervised inpatient low-calorie diet program for massive weight loss prior to RYGB in superobese patients. <i>Obes Surg</i> . 2010;20(2): 173-180	Huerta et al, 2010	ORYGB	Preoperative weight loss with a liquid protein diet	Prospective, Cohort study, Single centre	82	95 months	A prospective cohort study by Huerta et al. (2010) showed in 5 super obese patients that massive preoperative weight loss is possible to achieve with a liquid protein diet which greatly eases bypass surgery in an otherwise high-risk patient population
Junior WS, do Amaral JL, Nonino-Borges CB. Factors related to weight loss up to 4 years after bariatric surgery. <i>Obes Surg</i> 2011;21: 1724-1730.	Junior, 2011	RYGB	Preoperative weight loss, education, lack of adherence to nutritional guidelines	Retrospective cohort	149	up to 4 years	Junior et al. (2011) demonstrated in 149 RYGB patients with up to 4 years of follow-up that preoperative weight loss was associated with lower EWL 2 and 3 years after surgery
Patel P, Hartland A, Hollis A, et al. Tier 3 multidisciplinary medical weight management improves outcome of Roux-en-Y gastric bypass surgery. <i>Ann R Coll Surg Engl</i> . 2015;97(3):235-237.	Patel et al, 2015	RYGB	Tier 3 weight management followed by RYGB	Retrospective, Cohort Study, Single centre	110	12 months	Patel et al. (2015) demonstrated in 110 RYGB patients with 12 months of follow-up that patients who received intervention with a 6-month weight loss program prior to RYGB lost significantly more weight at 6 and 12 months post-operatively than patients who did not receive the intervention

## Pre-surgical weight loss positively impacts this outcome (-)

Article conclusions are mixed in their support of pre-surgical weight loss requirements

Citation	Author/Year	Procedure	Intervention	Study Type	No. of Patients/ Duration Follow-up		Outcomes
Alami RS, Morton JM, Schuster R, et al. Is there a benefit to preoperative weight loss in gastric bypass patients? A prospective randomized trial. <i>Surg Obes Relat Dis.</i> 2007;3(2):141-146. doi:10.1016/j.soard.2006.11.006.	Alami, 2007	RYGB	Weight loss group with a 10% WL requirement	RCT, single centre	61	12 months	Alami et al. (2007) performed a prospective randomized trial of 61 patients undergoing LRYGB surgery at a one-year follow-up. Of the 61 patients, data was available for 12 at a one-year follow-up. Preoperative weight loss before LRYGB was found to be associated with a decrease in the operating room time (p=0.0084) and an improved %EWL in the short term (p=0.0267); however, there was no significant impact on complication rate, resolution of comorbidities, or conversion rates; therefore, long-term effects could not be determined
Albanese A, Prevedello L, Markovich M, Busetto L, Vettor R, Foletto M. Pre-operative very low calorie ketogenic diet (VLCKD) vs. very low calorie diet (VLCD): surgical impact. <i>Obes Surg.</i> 2019 Jan;29(1):292-296. doi: 10.1007/s11695-018-3523-2.	Albanese, 2019	Laparoscopic sleeve gastrectomy (LSG)	Very-low-calorie ketogenic diet (VLCKD)	Retrospective analysis of a prospectical database, single-center	178	Pre-operative diet followed for 3 weeks	A study by Albanese et al. (2019) in 178 laparoscopic sleeve gastrectomy (LSG) patients demonstrated that 3 weeks of a very-low-calorie ketogenic diet (VLCKD) showed better results than very low-calorie diet (VLCD) on surgical outcome, influencing drainage output, post-operative hemoglobin levels, and hospital stay but did not compare against patients without pre-surgical weight loss programs
Kraus R, Stekhoven DJ, Leupold U, Marti WR. Linear mixed effects analysis reveals the significant impact of preoperative diet success on postoperative weight loss in gastric bypass surgery. <i>Obes Surg.</i> 2018;28(8):2473-2480. doi: 10.1007/s11695-018-3189-9.	Kraus, 2018	LRYGB	Pre and postoperative weight loss	Retrospective, cohort, single-center	239	24 months	A retrospective study of 239 LRYGB patients with 24 months follow-up by Kraus et al. (2018) demonstrated that patients successfully undergoing a preoperative diet also lose more weight postoperatively; however, the model was most predictive in the 4-6 months immediately following surgery, with diminishing effect at 24 months
Mrad BA, Stoklossa CJ, Bich DW. Does preoperative weight loss predict success following surgery for morbid obesity? <i>Am J Surg.</i> 2008; 195: 570-573.	Mrad et al, 2007	VBG or OGB or LGB or LAGB	Preoperative weight loss	Retrospective, Cohort Study, Single centre	146	3 months	Mrad et al, 2007 showed in 146 VBG or OGB or LGB or LAGB patients with 3 months of follow-up that postoperative weight loss was not influenced by preoperative weight change among women. However, men who gained weight preoperatively had significantly worse outcomes
Pratt KJ, Jalilvand A, Needleman B, Urse K, Feriby M, Noria S. Postoperative outcomes based on patient participation in a presurgery education and weight management program. <i>Surg Obes Relat Dis.</i> 2018;14(11):1714-1723. doi: 10.1016/j.soard.2018.08.006. Epub 2018 Aug 17.	Pratt, 2018	O-LRYGB	Presurgery weight management programs (WMPs)	Prospective, Cohort Study, Single centre	497	6 or 12 months	Pratt et al. (2018) carried out a retrospective medical record analysis in 497 patients undergoing RYGB and SG with 6- and/or 12-month postoperative follow-ups to show that patients attending the WMP had better 12-month %EWL and outcomes compared with those who did not; though this was not true for 6-month outcomes and differed based on surgery type and findings were not statistically significant in the overall population

## Pre-surgical weight loss positively impacts this outcome (-)

Article conclusions are mixed in their support of pre-surgical weight loss requirements

Citation	Author/Year	Procedure	Intervention	Study Type	No. of Patients/ Duration Follow-up	Outcomes
Still CD, Benotti P, Wood GC, et al. Outcomes of preoperative weight loss in high-risk patients undergoing gastric bypass surgery. <i>Arch Surg.</i> 2007;142(10):994-999. doi:10.1001/archsurg.142.10.994.	Still et al, 2007	O-LRYGB	Standardized multidisciplinary preoperative program with medical, psychological, nutritional, and surgical interventions and education	Prospective, Cohort Study, Single centre	884 45 months	A 2007 study by Still et al. reported in 884 O-LRYGB patients with 45 months of follow-up that patients who achieved loss of 5%-10% excess body weight prior to surgical intervention were more likely to achieve rapid post-surgical weight loss and shorter length of hospital stay; however, only 48% of patients were successful in achieving the 10% loss of excess body weight during the study period
Tan SYT, Loi PL, Lim CH, et al. Preoperative weight loss via very low caloric diet (VLCD) and its effect on outcomes after bariatric surgery. <i>Obes Surg.</i> 2020; 19:10.1007/s11695-020-04446-y. doi: 10.1007/s11695-020-04446-y. Online ahead of print.	Tan, 2020	sleeve gastrectomy (SG) or gastric bypass (GB)	Very-low calorie diet for 14 days preoperatively	Retrospective, single-center in Singapore	306 5 years (2008-2018)	Tan et al. (2020) found in 306 SG or GB patients prescribed a very low calorie diet for 14 days preoperatively that there was no significant difference in complication rate, duration of surgery or length of stay, regardless of surgery type, and no difference in TWL and Excess Body Mass Index Loss (%EBMIL) beyond 6 months in patients with WL <5% than patients with >5% WL
Van Nieuwenhove Y, Dambrauskas Z, Campillo-Soto A, et al. Preoperative very low-calorie diet and operative outcome after laparoscopic gastric bypass: a randomized multicenter study. <i>Arch Surg.</i> 2011;146(11):1300-1305. doi:10.1001/archsurg.2011.273.	Van Nieuwenhove 2011	RYGB	2-week preoperative VLCD regimen	RCT, Multi-centre	298 30 days	Van Nieuwenhove et al. (2011) showed in 273 LRYGB patients with 18 months of follow-up that pre-operative diet was not associated with differences in operating time or intraoperative complications. The pre-operative diet group, however experienced fewer 30-day complications

## Guidelines detail

**AACE/TOS/ASMBS/OMA/ASA 2019 Guidelines: CLINICAL PRACTICE GUIDELINES FOR THE PERIOPERATIVE NUTRITION, METABOLIC, AND NONSURGICAL SUPPORT OF PATIENTS UNDERGOING BARIATRIC PROCEDURES – 2019 UPDATE: COSPONSORED BY AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS/AMERICAN COLLEGE OF ENDOCRINOLOGY, THE OBESITY SOCIETY, AMERICAN SOCIETY FOR METABOLIC & BARIATRIC SURGERY, OBESITY MEDICINE ASSOCIATION, AND AMERICAN SOCIETY OF ANESTHESIOLOGISTS\***

The most recent joint guidelines strongly recommend that patients undergo a pre-procedure evaluation for obesity-related complications and causes of obesity, and that the evaluation include a comprehensive medical history, psychosocial history, physical examination, and appropriate lab testing to assess surgical risk. The guidelines also recommend, based on expert opinion, that patient medical records should contain clear documentation of the indications for bariatric surgery. Finally, pre-procedure weight loss or medical nutritional therapy may be recommended to patients in selected cases to improve comorbidities or improve technical aspects of surgery. These guidelines are at odds with recommendations from the ASMBS updated position statement issued in 2016 (described below).

### **ASMBS: Recommendations for the presurgical psychosocial evaluation of bariatric surgery patients**

It is recommended that bariatric behavioral health clinicians with specialized knowledge and experience be involved in patient evaluation both before and after surgery due to their ability to identify factors that may pose challenges to optimal surgical outcomes and make recommendations to the patients as well as bariatric team on how to address these challenges.

### **ASMBS: ASMBS updated position statement on insurance mandated preoperative weight loss requirements**

ASMBS sees insurance-mandated preoperative weight loss as unethical, discriminatory, arbitrary, and scientifically unfounded, noting that it contributes to patient attrition, causes unnecessary delay of lifesaving treatment, and leads to the progression of life-threatening comorbid conditions. ASMBS notes that there is no Level I data in surgical literature or consensus in the medical literature that has clearly identified any dietary regimen, duration, or type of weight loss program that is optimal for patients with severe clinical obesity. It is recommended that insurance-mandated preoperative weight loss requirements be abandoned in favor of evaluation by a provider, who is best suited to determine what constitutes a failed weight loss effort for their patient.

## Coverage policy detail

### **United Healthcare**

UnitedHealthcare's policy states that, in order to be eligible for bariatric surgery, adults must complete both preoperative evaluation that includes a detailed weight history along with dietary and physical activity patterns as well as a psychological-behavioral evaluation in order to identify risk factors or potential postoperative challenges that may contribute to poor outcomes. Alternatively, adults have the option of participating in a multidisciplinary surgical preparatory regimen. There is no mention of any requirements/parameters around participation in a presurgical program. UnitedHealthcare cites one article of the articles identified in this analysis (Still 2007) with mixed findings with regards to the utility of pre-surgical programs for bariatric surgery patients. In their discussion of the article, United notes that although the findings are suggestive of a potential benefit of significant pre-operative weight loss on long-term outcomes, however, they note that the findings may not be generalizable, and that additional research is needed.

United Healthcare's current policy (effective November 2019) is significantly less strict than the policy from one year prior in that the requirement for involvement in a structured diet/weight loss program for at least 6 months prior to surgery has been removed. The removal of this program shows a trend that is much more in line with recent findings in literature.

### **Cigna**

Cigna's policy states that a patient is eligible for bariatric surgery after receiving a statement from a licensed provider noting that the individual has failed previous attempts to achieve weight loss by medical management as well as the completion of a thorough multidisciplinary evaluation within 6 months prior to surgery. This evaluation must include a description of the procedure, a recommendation for bariatric surgery from someone other than the requesting surgeon, clearance for bariatric surgery by a mental health provider, and a nutritional evaluation by physician or RN. Cigna cites

the highest number of studies (four) identified in this analysis within their coverage policy, including only one study that supports use of pre-surgical programs, two with mixed findings, and one that supports removal of pre-surgical programs. Cigna updated their policy in July of 2018 to remove the requirement for active participation in a physician supervised weight-management program for at least 3 consecutive months within 12 months prior to surgery. This update is in line with the trend that is making bariatric surgery more accessible to patients in need.

### BCBS of NC

BCBS of NC's preoperative policy states that a patient is eligible bariatric surgery after completion of a thorough preoperative evaluation which includes an evaluation of the patients understanding of the procedure and implications surrounding the procedure, an evaluation of the patient's family/caregivers support and understanding of the implications surrounding the procedure, a thorough nutritional evaluation (per ASMBS guidelines) within 12 months prior to surgery, an evaluation by a licensed psychologist, an appropriate medical work up , and anesthesia clearance. There is no mention of any preoperative weight loss requirements in order to be eligible for bariatric surgery. Blue Cross Blue Shield of North Carolina does not cite a single article identified in this analysis, although they do cite the 2019 ASMBS guidelines.

BCBS of NC's current policy (effective November 2019) removed the language around a requirement for one year of conservative medical management prior to bariatric surgery and notes that the judgement regarding the scope, depth, and adequacy or pre-surgical treatment during the year prior to surgery is at the discretion of the multidisciplinary surgery team. BCBS of NC does not specify the content of the treatment. This update to the policy falls in line with the patient focused, physician directed care that is supported by recent literature.

### HCSC

HCSC's policy states that a patient is eligible for bariatric surgery after the completion of an evaluation by a master's level or higher behavioral healthcare provider within 12 months preceding the request for surgery. This evaluation should document the absence of psychopathology that would hinder the ability to understand the procedure and comply with recommendations, the absence of any psychological comorbidity that could contribute to weight mismanagement or a diagnosed eating disorder, and a patient's willingness to comply with pre- and post-operative treatment plans. It is also required to obtain documentation from the surgeon that the patient has been educated and understands the post-operative regimen which should include willingness to comply with a nutrition program (may include a VLCD or a commercial diet-based program), behavior modification or behavioral health interventions, counseling and instruction on exercise and increased physical activity, and ongoing support for lifestyle changes that will reduce health risk factors in improve overall health.

HCSC updated their bariatric surgery policy in February of 2012 to remove the selection requirement for a pre-surgical weight loss program for a minimum of 6 months, occurring within 24 months prior to bariatric surgery. Currently, HCSC does not specify any requirements around preoperative weight loss requirements, leaving to the discretion of the treating physicians.

### Table with studies cited by guidelines, UHC, Cigna and BCBS of NC

Only 11 of the 37 unique studies identified were cited by either a guidelines paper or coverage policy reviewed. Of those, only three were cited by more than one document.

Author, Year	ASMBS 2016 Updated Statement	ASMBS 2016 Psychosocial	AACE/ASMBS 2019	United	Cigna	BCBS NC	HCSC
Keith, 2018			Cited				
Parikh 2012	Cited						
Kuwada, 2011	Cited						
Becouarn, 2010							
Fujioka, 2008							
Jamal 2006	Cited				Cited		
Van Nieuwenhove 2011	Cited						
Alami, 2007					Cited		
Still, 2007				Cited			
Benotti, 2009					Cited		
Alvarado, 2007							

Within coverage policies, neither the systematic review, the meta-analysis, nor the 2015 ICER evaluation were cited; furthermore, even guidelines were only cited infrequently:

UHC	Cigna	BCBS	NC	HCSC
ASMBS Updated 2016	Cited	Cited	Not cited	Not cited
AACE 2013	Cited	Cited	Not cited	Not cited
ASMBS 2016 Psychosocial	Cited	Not cited	Not cited	Not cited
AACE/ ASMBS 2019	Not cited	Not cited	Cited	Not cited

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**Abbreviations:** Laparoscopic sleeve gastrectomy (LSG), weight management program (WMP), sleeve gastrectomy (SG), gastric bypass (GB), total weight loss (TWL), laparoscopic Roux-en-Y gastric bypass (LRYGB), excess weight loss (EWL), time to surgery (TTS), very low-calorie diet (VLCD).