EXECUTIVE SUMMARY OF THE RECOMMENDATIONS OF THE AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS, THE OBESITY SOCIETY, AND AMERICAN SOCIETY FOR METABOLIC & BARIATRIC SURGERY MEDICAL GUIDELINES FOR CLINICAL PRACTICE FOR THE PERIOPERATIVE NUTRITIONAL, METABOLIC, AND NONSURGICAL SUPPORT OF THE BARIATRIC SURGERY PATIENT

Complete guidelines are available at www.aace.com

Jeffrey I. Mechanick, MD, FACP, FACE, FACN, Robert F. Kushner, MD, Harvey J. Sugerman, MD, J. Michael Gonzalez-Campoy, MD, PhD, FACE, Maria L. Collazo-Clavell, MD, FACE, Safak Guven, MD, FACP, FACE, Adam F. Spitz, MD, FACE, Caroline M. Apovian, MD, Edward H. Livingston, MD, FACS, Robert Brolin, MD, David B. Sarwer, PhD, Wendy A. Anderson, MS, RD, LDN, and John Dixon, MD

American Association of Clinical Endocrinologists, The Obesity Society, and American Society for Metabolic & Bariatric Surgery Medical Guidelines for Clinical Practice are systematically developed statements to assist health-care professionals in medical decision making for specific clinical conditions. Most of the content herein is based on literature reviews. In areas of uncertainty, professional judgment was applied.

These guidelines are a working document that reflects the state of the field at the time of publication. Because rapid changes in this area are expected, periodic revisions are inevitable. We encourage medical professionals to use this information in conjunction with their best clinical judgment. The presented recommendations may not be appropriate in all situations. Any decision by practitioners to apply these guidelines must be made in light of local resources and individual patient circumstances.

The American Society for Parenteral & Enteral Nutrition fully endorses sections of these guidelines that address the metabolic and nutritional management of the bariatric surgical patient.

WRITING COMMITTEE

Cochairmen
Jeffrey I. Mechanick, MD, FACP, FACE, FACN
Robert F. Kushner, MD
Harvey J. Sugerman, MD

American Association of Clinical Endocrinologists
Bariatric Surgery Task Force Primary Writers
J. Michael Gonzalez-Campoy, MD, PhD, FACE
Maria L. Collazo-Clavell, MD, FACE
Safak Guven, MD, FACP, FACE
Adam F. Spitz, MD, FACE

The Obesity Society Bariatric Surgery Task Force Primary Writers
Caroline M. Apovian, MD
Edward H. Livingston, MD, FACS
Robert Brolin, MD
David B. Sarwer, PhD
Wendy A. Anderson, MS, RD, LDN

American Society for Metabolic & Bariatric Surgery Primary Writer
John Dixon, MD

REVIEWERS

American Association of Clinical Endocrinologists
Nutrition Committee Reviewers
Elise M. Brett, MD, FACE, CNSP
Osama Hamdy, MD, PhD
M. Molly McMahon, MD, FACE
Yi-Hao Yu, MD, FACE

The Obesity Society Reviewers
Ken Fujioka, MD
Susan Cummings, MS, RD
Stephanie Sogg, PhD

American Society for Metabolic & Bariatric Surgery Reviewers
Philip R. Schauer, MD
Scott A. Shikora, MD
Jaime Ponce, MD
Michael Sarr, MD

Abbreviations:
BEL = "best evidence" rating level; **BMI** = body mass index; **BPD** = biliopancreatic diversion; **BPD/DS** = biliopancreatic diversion with duodenal switch; **CT** = computed tomography; **DVT** = deep venous thrombosis; **ICU** = intensive care unit; **LAGB** = laparoscopic adjustable gastric band; **R** = recommendation; **RYGB** = Roux-en-Y gastric bypass; **T2DM** = type 2 diabetes mellitus

8. EXECUTIVE SUMMARY OF RECOMMENDATIONS

The following 166 recommendations (labeled "**R**") are evidence-based (Grades A, B, and C) or based on expert opinion because of a lack of conclusive clinical evidence (Grade D). The "best evidence" rating level (**BEL**), which corresponds to the best conclusive evidence found, accompanies the recommendation grade in this Executive Summary. Details regarding the mapping of clinical evidence ratings to these recommendation grades are provided in the online Appendix (Section 9, "Discussion of the Clinical Evidence").

8.1. Which Patients Should Be Offered Bariatric Surgery?

The selection criteria and exclusion factors for bariatric surgery are outlined in Table 7. (***Note**: Table numbers in this Executive Summary correspond to those in the complete guidelines published online at www.aace.com.*)

- **R1.** Patients with a body mass index (BMI) ≥40 kg/m^2 for whom bariatric surgery would not be associated with excessive risk should be eligible for one of the procedures **(Grade A; BEL 1)**.

- **R2.** Patients with a BMI ≥35 kg/m^2 and one or more severe comorbidities, including coronary artery disease, type 2 diabetes mellitus (T2DM), obstructive sleep apnea, obesity-hypoventilation syndrome, pickwickian syndrome (a combination of obstructive sleep apnea and obesity-hypoventilation syndrome), nonalcoholic fatty liver disease or nonalcoholic steatohepatitis, hypertension, dyslipidemia, pseudotumor cerebri, gastroesophageal reflux disease, asthma, venous stasis disease, severe urinary incontinence, debilitating arthritis, or considerably impaired quality of life may also be offered a bariatric procedure if the surgical risks are not excessive **(Grade A; BEL 1)**.

Table 7
Selection Criteria for Bariatric Surgery[a]

Factor	Criteria
Weight	
Adults	BMI ≥40 kg/m^2 with no comorbidities
	BMI ≥35 kg/m^2 with obesity-associated comorbidity
Children and adolescents	>95th percentile of weight for age + severe comorbidity
Weight loss history	Failure of previous nonsurgical attempts at weight reduction, including nonprofessional programs (for example, Weight Watchers, Inc)
Commitment	Expectation that patient will adhere to postoperative care Follow-up visits with physician(s) and team members Recommended medical management, including the use of dietary supplements Instructions regarding any recommended procedures or tests
Exclusion	Reversible endocrine or other disorders that can cause obesity Current drug or alcohol abuse Uncontrolled, severe psychiatric illness Lack of comprehension of risks, benefits, expected outcomes, alternatives, and lifestyle changes required with bariatric surgery

[a] BMI = body mass index.

- **R3.** Currently, insufficient data are available to recommend bariatric surgery for patients with a BMI <35 kg/m^2 **(Grade D)**.

- **R4.** There is insufficient evidence for recommending bariatric surgery specifically for glycemic control independent of BMI criteria **(Grade D)**.

- **R5.** Children and adolescents over the 95th percentile for weight based on age should be considered for a bariatric procedure in a specialized center when a severe comorbidity is present and only after a very careful assessment of such patients and their parents **(Grade D)**.

8.2. Which Bariatric Surgical Procedure Should Be Offered?

- **R6.** Only the laparoscopic adjustable gastric band (LAGB) and Roux-en-Y gastric bypass (RYGB) should be offered to children and adolescents **(Grade D)**.

- **R7.** The best choice for any bariatric procedure (type of procedure and type of approach) depends on the available local-regional expertise (surgeon and institution), patient preferences, risk stratification, and other idiosyncratic factors, with which the referring physician (or physicians) must become familiar **(Grade D)**. At this time, there is insufficient conclusive evidence to recommend specific bariatric surgical procedures for the general severely obese population **(Grade D)**. Specialists in bariatric medicine, however, must also familiarize themselves with the outcome data among the various bariatric surgical procedures **(Grade D)**. Physicians should exercise caution when recommending biliopancreatic diversion (BPD), biliopancreatic diversion with duodenal switch (BPD/DS), or related procedures because of greater associated risks reported in the literature **(Grade C; BEL 3)**.

- **R8.** Although risks and benefits are associated with both approaches, laparoscopic bariatric procedures are preferred over open bariatric procedures if sufficient surgical expertise is available **(Grade B; BEL 2 [randomized and nonrandomized])**.

- **R9.** A first-stage sleeve gastrectomy may be performed in high-risk patients to induce an initial weight loss (25 to 45 kg), with the possibility of then performing a second-stage RYGB or BPD/DS after the patient's operative risk has improved. This is currently an investigational procedure **(Grade C; BEL 3)**.

8.3. How Should Potential Candidates for Bariatric Surgery Be Managed Preoperatively?

- **R10.** All patients should undergo evaluation for causes and complications of obesity, with special attention directed to those factors that could affect a recommendation for bariatric surgery (Table 8) **(Grade A; BEL 1)**.

- **R11.** The preoperative evaluation must include a comprehensive medical history, physical examination, and appropriate laboratory testing **(Grade A; BEL 1)**.

- **R12.** The medical necessity for bariatric surgery should be documented **(Grade D)**.

- **R13.** There should be a thorough discussion with the patient regarding the risks and benefits, procedural options, and choices of surgeon and medical institution **(Grade D)**.

- **R14.** Patients should be provided with educational materials and access to preoperative educational sessions at prospective bariatric surgery centers **(Grade D)**.

- **R15.** Financial counseling should be provided, and the physician should be able to provide all necessary clinical material for documentation so that third-party payer criteria for reimbursement are met **(Grade D)**.

- **R16.** Preoperative weight loss should be considered in patients in whom reduction of liver volume can improve the technical aspects of surgery **(Grade B; BEL 2 [nonrandomized])**.

8.4. System-Oriented Approach to Medical Clearance for Bariatric Surgery

8.4.1. Endocrine

8.4.1.1. Diabetes

- **R17.** Preoperative glycemic control should be optimized with use of medical nutrition therapy and physical activity; orally administered agents and insulin should be introduced as needed **(Grade D)**.

- **R18.** Reasonable targets for preoperative glycemic control should be a hemoglobin A1c value of 7.0% or less, a fasting blood glucose level of 110 mg/dL or less, and a 2-hour postprandial blood glucose concentration of 140 mg/dL or less (see http://www.aace.com/pub/pdf/guidelines/DMGuidelines2007.pdf), but these variables are based on evidence related to long-term outcome and may not be applicable in this setting **(Grade D)**.

- **R19.** A protocol for perioperative glycemic control should be reviewed *before* the patient undergoes bariatric surgery **(Grade D)**.

Table 8
Metabolic Complications of Bariatric Surgery[a]

Complication	Clinical features	Management
Acid-base disorder	Metabolic acidosis, ketosis	Bicarbonate orally or intravenously; adjust acetate content in PN
	Metabolic alkalosis	Salt and volume loading (enteral or parenteral)
Bacterial overgrowth (primarily with BPD, BPD/DS)	Abdominal distention Pseudo-obstruction Nocturnal diarrhea Proctitis Acute arthralgia	Antibiotics (metronidazole) Probiotics (http://www.culturelle.com)
Electrolyte abnormalities (primarily with BPD, BPD/DS)	Low Ca, K, Mg, Na, P Arrhythmia, myopathy	Enteral or parenteral repletion
Fat-soluble vitamin deficiency	Vitamin A—night vision Vitamin D—osteomalacia Vitamin E—rash, neurologic Vitamin K—coagulopathy	Vitamin A, 5,000-10,000 U/d Vitamin D, 400-50,000 U/d Vitamin E, 400 U/d Vitamin K, 1 mg/d ADEK, 2 tablets twice a day (http://www.scandipharm.com)
Folic acid deficiency	Hyperhomocysteinemia Anemia Fetal neural tube defects	Folic acid supplementation
Iron deficiency	Anemia	Ferrous fumarate, sulfate, or gluconate Up to 150-300 mg elemental iron daily Add vitamin C and folic acid
Osteoporosis	Fractures	DXA, calcium, vitamin D, and consider bisphosphonates
Oxalosis	Kidney stones	Low oxalate diet Potassium citrate Probiotics
Secondary hyperparathyroidism	Vitamin D deficiency Negative calcium balance Osteoporosis	DXA Serum intact PTH level 25-Hydroxyvitamin D levels Calcium and vitamin D supplements
Thiamine deficiency (vitamin B_1)	Wernicke-Korsakoff encephalopathy Peripheral neuropathy Beriberi	Thiamine intravenously followed by large-dose thiamine orally
Vitamin B_{12} deficiency	Anemia Neuropathy	Parenteral vitamin B_{12} Methylmalonic acid level

[a] BPD = biliopancreatic diversion; BPD/DS = biliopancreatic diversion with duodenal switch; DXA = dual-energy x-ray absorptiometry; PN = parenteral nutrition; PTH = parathyroid hormone.

8.4.1.2. Thyroid

- **R20.** Routine screening recommendations for hypothyroidism are conflicting. When thyroid disease is suspected, a sensitive serum thyroid-stimulating hormone level should be ordered **(Grade D)**.

- **R21.** In patients found to have thyroid dysfunction, treatment should be initiated before bariatric surgery **(Grade D)**.

8.4.1.3. Lipids

- **R22.** A fasting lipid panel should be obtained in all patients with obesity **(Grade A; BEL 1)**.

- **R23.** Treatment should be initiated according to the National Cholesterol Education Program Adult Treatment Panel III guidelines (see http://www.nhlbi.nih.gov/guidelines/cholesterol/) **(Grade D)**.

8.4.1.4. Polycystic ovary syndrome and fertility

- **R24.** Candidates for bariatric surgery should minimize the risk of pregnancy for at least 12 months perioperatively **(Grade C; BEL 3)**.

- **R25.** All women of reproductive age should be counseled on contraceptive choices **(Grade D)**.

- **R26.** Women with a LAGB should be closely monitored during pregnancy because band adjustment may be necessary **(Grade B; BEL 2 [nonrandomized])**.

- **R27.** Estrogen therapy should be discontinued before bariatric surgery (1 cycle of oral contraceptives in premenopausal women; 3 weeks of hormone replacement therapy in postmenopausal women) to reduce the risks for postoperative thromboembolic phenomena **(Grade D)**.

- **R28.** Women with polycystic ovary syndrome should be advised that their fertility status may be improved postoperatively **(Grade D)**.

8.4.1.5. Exclusion of endocrine causes of obesity

- **R29.** Routine laboratory testing to screen for rare causes of obesity (for example, Cushing syndrome, hypothalamic obesity syndromes, melanocortin-4 mutations, and leptin deficiency obesity) is not cost-effective and not recommended **(Grade D)**.

- **R30.** Case-by-case decisions to screen for rare causes of obesity should be based on specific historical and physical findings **(Grade D)**.

8.4.2. Cardiology and Hypertension

- **R31.** Noninvasive testing beyond an electrocardiogram is determined on the basis of the individual risk factors and findings on history and physical examination **(Grade D)**.

- **R32.** Patients with known cardiac disease should have a formal cardiology consultation before bariatric surgery **(Grade D)**.

- **R33.** Patients at risk for heart disease should undergo evaluation for perioperative β-adrenergic blockade **(Grade A; BEL 1)**.

8.4.3. Pulmonary and Sleep Apnea

- **R34.** All patients considered for bariatric surgery should have a chest radiograph preoperatively **(Grade D)**.

- **R35.** Patients with intrinsic lung disease or disordered sleep patterns should have a formal pulmonary evaluation, including arterial blood gas measurement and sleep polysomnography, when knowledge of the results would alter patient care **(Grade D)**.

- **R36.** Patients should stop smoking at least 8 weeks before bariatric surgery and should plan to quit smoking or to participate in a smoking cessation program postoperatively **(Grade C; BEL 3)**.

8.4.4. Venous Disease

- **R37.** Patients at risk for, or with a history of, deep venous thrombosis (DVT) or cor pulmonale should undergo an appropriate diagnostic evaluation for DVT **(Grade D)**.

- **R38.** A prophylactic vena caval filter should be considered for patients with a history of prior pulmonary embolus, prior iliofemoral DVT, evidence of venostasis, known hypercoagulable state, or increased right-sided heart pressures **(Grade C; BEL 3)**.

8.4.5. Gastrointestinal

- **R39.** All gastrointestinal symptoms should be evaluated and treated before bariatric surgery **(Grade D)**.

- **R40.** All patients considered for bariatric surgery who have results of increased liver function tests (2 to 3 times the upper limit of normal) should undergo abdominal ultrasonography and a viral hepatitis screen **(Grade D)**.

- **R41.** There is inconsistent evidence to recommend routine screening for the presence of *Helicobacter pylori* before bariatric surgery **(Grade D)**.

8.4.6. Rheumatologic and Metabolic Bone Disease

- **R42.** There are no evidence-based, routine preoperative tests required for evaluation of rheumatologic problems **(Grade D)**.

- **R43.** There are insufficient data to warrant routine preoperative assessment of bone mineral density with dual-energy x-ray absorptiometry **(Grade D)**.

8.4.7. Psychiatric

- **R44.** A psychosocial-behavioral evaluation, which assesses environmental, familial, and behavioral factors, should be considered for all patients before bariatric surgery **(Grade D)**.

- **R45.** Any patient considered for bariatric surgery with a known or suspected psychiatric illness should undergo a formal mental health evaluation before performance of the surgical procedure **(Grade C; BEL 3)**.

- **R46.** All patients should undergo evaluation of their ability to incorporate nutritional and behavioral changes before and after bariatric surgery **(Grade D)**.

8.4.8. Nutritional

- **R47.** All patients should undergo an appropriate nutritional evaluation, including selective micronutrient measurements, before any bariatric surgical procedure **(Grade C; BEL 3)**. In comparison with purely restrictive procedures, more extensive perioperative nutritional evaluations are required for malabsorptive procedures.

8.5. Early Postoperative Care (<5 Days)

8.5.1. Nutrition

- **R48.** A clear liquid meal program can usually be initiated within 24 hours after any of the bariatric procedures, but this schedule should be discussed with the surgeon **(Grade C; BEL 3)**.

- **R49.** A consultation should be arranged with a registered dietitian who is a member of the bariatric surgery team **(Grade D)**.

- **R50.** A protocol-derived staged meal progression, based on the type of surgical procedure, should be provided to the patient. Sample protocols are shown in Tables 9, 10, and 11 **(Grade D)**.

- **R51.** Nutrition and meal planning guidance should be provided to the patient and family before bariatric surgery and during the postoperative hospital course and reinforced during future outpatient visits **(Grade D)**.

- **R52.** Patients should adhere to a plan of multiple small meals each day, chewing their food thoroughly without drinking beverages at the same time (more than 30 minutes apart) **(Grade D)**.

- **R53.** Patients should be advised to adhere to a balanced meal plan that consists of more than 5 servings of fruits and vegetables daily for optimal fiber consumption, colonic function, and phytochemical consumption **(Grade D)**.

- **R54.** Protein intake should average 60 to 120 g daily **(Grade D)**.

- **R55.** Concentrated sweets should be avoided after RYGB to minimize symptoms of the dumping syndrome or after any bariatric procedure to reduce caloric intake **(Grade D)**.

- **R56.** Minimal nutritional supplementation includes 1 to 2 adult multivitamin-mineral supplements containing iron, 1,200 to 1,500 mg/d of calcium, and a vitamin B-complex preparation **(Grade B; BEL 2 [nonrandomized])**.

- **R57.** Fluids should be consumed slowly and in sufficient amounts to maintain adequate hydration (more than 1.5 L daily) **(Grade D)**.

- **R58.** Parenteral nutrition should be considered in high-risk patients, such as critically ill patients unable to tolerate sufficient enteral nutrition for more than 5 to 7 days or noncritically ill patients unable to tolerate sufficient enteral nutrition for more than 7 to 10 days **(Grade D)**.

8.5.2. Diabetes

- **R59.** In patients with T2DM, periodic fasting blood glucose concentrations should be determined. Preprandial and bedtime reflectance meter glucose ("finger-stick") determinations in the home setting should be encouraged, depending on the patient's ability to test and the level of glycemic control. Finger-stick glucose determinations should also be performed if symptoms of hypoglycemia occur **(Grade A; BEL 1)**.

- **R60.** Use of all insulin secretagogue drugs (sulfonylureas and meglitinides) should be discontinued **(Grade D)**.

- **R61.** In non-intensive care unit (ICU) hospitalized patients, a rapid-acting insulin analogue should be administered before meals and at bedtime to maintain maximal postprandial values below 180 mg/dL **(Grade D)**.

- **R62.** In non-ICU hospitalized patients, fasting blood glucose levels should be maintained between 80 and 110 mg/dL with the use of a long-acting insulin analogue, such as insulin glargine (Lantus) or detemir (Levemir) **(Grade D)**.

Table 9
Suggested Meal Progression After Roux-en-Y Gastric Bypass

Diet stage[a]	Begin	Fluids/food	Guidelines
Stage I	Postop days 1 and 2	Clear liquids Noncarbonated; no calories No sugar; no caffeine	On postop day 1, patients undergo a Gastrografin swallow test for leaks; once tested, begin sips of clear liquids
Stage II **Begin supplementation:** **Chewable** multivitamin with minerals, × 2/d **Chewable or liquid** calcium citrate with vitamin D	Postop day 3 (discharge diet)	**Clear liquids** • Variety of no-sugar liquids or artificially sweetened liquids • Encourage patients to have salty fluids at home • Solid liquids: sugar-free ice pops **PLUS full liquids** • ≤15 g of sugar per serving • Protein-rich liquids (limit 20 g protein per serving of added powders)	Patients should consume a minimum of 48-64 fluid ounces of total fluids per day: 24-32 ounces or more of clear liquids plus 24-32 ounces of any combination of full liquids: • Nonfat milk mixed with whey or soy protein powder (limit 20 g protein per serving) • Lactaid milk or soy milk mixed with soy protein powder • Light yogurt, blended • Plain nonfat yogurt; Greek yogurt
Stage III	Postop days 10-14[a]	Increase clear liquids (total liquids 48-64+ ounces per day) and replace full liquids with soft, moist, diced, ground or pureed protein sources as tolerated **Stage III, week 1:** eggs, ground meats, poultry, soft, moist fish, added gravy, bouillon, light mayonnaise to moisten, cooked bean, hearty bean soups, cottage cheese, low-fat cheese, yogurt	Protein food choices are encouraged for 4-6 small meals per day; patients may be able to tolerate only a couple of tablespoons at each meal or snack. Chew foods thoroughly prior to swallowing (consistency of applesauce). Encourage patients not to drink with meals and to wait ~30 minutes after each meal before resuming fluids. Eat from small plates and advise using small utensil to help control portions
Stage III	4 weeks postop	Advance diet as tolerated; if protein foods, add well-cooked, soft vegetables and soft and/or peeled fruit. Always eat protein first	Adequate hydration is essential and a priority for all patients during the rapid weight-loss phase
Stage III	5 weeks postop	Continue to consume protein with some fruit or vegetable at each meal; some people tolerate salads at 1 month postop	**AVOID** rice, bread, and pasta until patient is comfortably consuming 60 g protein per day plus fruits and vegetables
Stage IV Vitamin and mineral supplementation daily.[b] May switch to pill form if <11 mm in width and length after 2 months postop	As hunger increases and more food is tolerated	Healthy solid food diet	Healthy, balanced diet consisting of adequate protein, fruits, vegetables, and whole grains. Eat from small plates and advise using small utensil to help control portions. Calorie needs based on height, weight, and age

[a] There is no standardization of diet stages; there are a wide variety of nutrition therapy protocols for how long patients stay on each stage and what types of fluids and foods are recommended.
[b] Nutritional laboratory studies should be monitored (see Table 13); bone density test at baseline and about every 2 years.
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Table 10
Suggested Meal Progression After Laparoscopic Adjustable Gastric Band Procedure

Diet stage[a]	Begin	Fluids/food	Guidelines
Stage I	Postop days 1 and 2	Clear liquids Noncarbonated; no calories No sugar; no caffeine	On postop day 1, patients may begin sips of water and Crystal Light; avoid carbonation
Stage II **Begin supplementation:** **Chewable** multivitamin with minerals, × 2/d **Chewable or liquid** calcium citrate with vitamin D	Postop days 2-3 (discharge diet)	**Clear liquids** • Variety of no-sugar liquids or artificially sweetened liquids **PLUS full liquids** • ≤15 g of sugar per serving • Protein-rich liquids (≤3 g fat per serving)	Patients should consume a minimum of 48-64 ounces of total fluids per day: 24-32 ounces or more of clear liquids plus 24-32 ounces of any combination of full liquids: • 1% or skim milk mixed with whey or soy protein powder (limit 20 g protein per serving) • Lactaid milk or soy milk mixed with soy protein powder • Light yogurt, blended • Plain yogurt
Stage III	Postop days 10-14[a]	Increase clear liquids (total liquids 48-64 fl oz or more per day) and replace full liquids with soft, moist, diced, ground or pureed protein sources as tolerated **Stage III, week 1:** eggs, ground meats, poultry, soft, moist fish, added fat-free gravy, bouillon, light mayonnaise to moisten, cooked bean, hearty bean soups, low-fat cottage cheese, low-fat cheese, yogurt	**NOTE:** Patients should be reassured that hunger is common and normal postop. Protein food (moist, ground) choices are encouraged for 3-6 small meals per day, to help with satiety, since hunger is common within ~1 week postop. Mindful, slow eating is essential. Encourage patients not to drink with meals and to wait ~30 minutes after each meal before resuming fluids. Eat from small plates and advise using small utensil to help control portions
Stage III	4 weeks postop	Advance diet as tolerated; if protein foods tolerated in week 1, add well-cooked, soft vegetables and soft and/or peeled fruit	Adequate hydration is essential and a priority for all patients during the rapid weight-loss phase. Consume protein at every meal and snack, especially if increased hunger noted before initial fill or adjustment. Very well-cooked vegetables may also help to increase satiety
Stage III	5 weeks postop	Continue to consume protein with some fruit or vegetable at each meal; some people tolerate salads at 1 month postop	If patient is tolerating soft, moist, ground, diced, and/or pureed proteins with small amounts of fruits and vegetables, may add crackers (use with protein) **AVOID** rice, bread, and pasta
Stage IV Vitamin and mineral supplementation daily[b]	As hunger increases and more food is tolerated	Healthy solid food diet	Healthy, balanced diet consisting of adequate protein, fruits, vegetables, and whole grains. Eat from small plates and advise using small utensil to help control portions. Calorie needs based on height, weight, and age
Fill/adjustment	~6 weeks postop and possibly every 6 weeks until satiety reached	Full liquids × 2-3 days post-fill, then advance to Stage III, week 1 guidelines above, as tolerated for another 2-3 days, then advance to the final stage and continue	Same as Stage II liquids above × 48-72 hours (and/or as otherwise advised by surgeon). **NOTE:** When diet advanced to soft solids, special attention to mindful eating and chewing until in liquid form, since more restriction may increase risk for obstruction above stoma of band if food not thoroughly chewed (consistency of applesauce)

[a] There is no standardization of diet stages; there are a wide variety of nutrition therapy protocols for how long patients stay on each stage and what types of fluids and foods are recommended.
[b] Nutritional laboratory studies should be monitored (see Table 13); bone density test at baseline and about every 2 years.
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Table 11
Suggested Meal Progression After Biliopancreatic Diversion (± Duodenal Switch)

Diet stage[a]	Begin	Fluids/food	Guidelines
Stage I	Postop days 1 and 2	Clear liquids[b] Noncarbonated; no calories No sugar; no caffeine	Clear liquids started after swallow test
Stage II **Begin supplementation:** **Chewable** multivitamin with minerals, × 2/d **Iron supplement** • **Add vitamin C for absorption if not already included within the supplement** **Chewable or liquid** calcium citrate containing vitamin D, 2,000 mg/d **Vitamin B_{12}: at least** 350-500 µg crystalline daily; might need vitamin B_{12} intramuscularly **Fat-soluble vitamins: A, D, E, K** • High risk for fat-soluble vitamin deficiencies • A: 5,000-10,000 IU/d • D: 600-50,000 IU/d • E: 400 IU/d • K: 1 mg/d Advise ADEK tablets × 2/d	Postop day 3	**Clear liquids** • Variety of no-sugar liquids or artificially sweetened liquids • Encourage patients to have salty fluids at home • Solid liquids: sugar-free ice pops **PLUS full liquids**[b] • ≤15 g of sugar per serving • Protein-rich liquids	**Protein** malnutrition is the most severe macronutrient complication after BPD/DS; regular monitoring and assessment of protein intake and status are very important ~90 g of protein a day is recommended; since early postop this is difficult for most patients, set goal to consume ≥60 g of protein per day plus clear liquids, and increase as tolerated. Patients should consume a minimum of 64 ounces of total fluids per day; 24-32 ounces or more of clear liquids plus 4-5 eight-ounce servings a day of any combination of full liquids—**1% or skim milk, Lactaid nonfat milk, or nonfat soy milk fortified with calcium mixed with:** • Whey or soy protein powder (20-25 g protein per serving of protein powder) • Light yogurt, blended • Plain yogurt; Greek yogurt
Stage III	Postop days 10-14[a]	Increase clear liquids (total liquids, 75+ ounces per day), and replace full liquids with soft, moist, diced, ground or pureed protein sources as tolerated **Stage III, week 1:** eggs, ground meats, poultry, soft, moist fish, added nonfat gravy, bouillon, light mayonnaise to moisten, cooked bean, hearty bean soups, low-fat cottage cheese, low-fat cheese, light yogurt	Protein food choices are encouraged for 3-6 small meals per day; patients may be able to tolerate only a couple of tablespoons at each meal or snack. Encourage patients not to drink with meals and to wait ≥30 minutes after each meal before resuming fluids. Patients might need to continue with supplementation of protein drinks to meet protein needs (90 g of protein daily is the goal)
Stage III	6 weeks postop	Advance diet as tolerated; add well-cooked, soft vegetables and soft and/or peeled fruit. Always eat protein first	Patients should be counseled to focus on protein at every meal and snack and to avoid starches or concentrated carbohydrates; 10-12 ounces of lean meats, poultry, fish, or eggs or some combination of high biologic value protein and protein supplement powders. Adequate hydration is essential and a priority for all patients during the rapid weight-loss phase. Wait ≥30 minutes after meals before resuming liquids
Stage III	12 weeks postop	Continue to consume protein with some fruit or vegetable at each meal; some people tolerate salads at 1 month postop; starches should be limited to whole grain crackers with protein, potato, and/or dry low-sugar cereals moistened with milk. Protein continues to be a high priority	**AVOID** rice, bread, and pasta until patient is comfortably consuming 90 g of protein per day plus fruits and vegetables

[a] There is no standardization of diet stages; there are a wide variety of nutrition therapy protocols for how long patients stay on each stage and what types of fluids and foods are recommended.
[b] Clear and full liquids for biliopancreatic diversion with duodenal switch (BPD/DS) are the same as for Roux-en-Y gastric bypass (see Table 9).
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- **R63.** In the ICU, all blood glucose levels should be maintained ideally within the range of 80 to 110 mg/dL by using an intravenous insulin infusion **(Grade A; BEL 1)**.

8.5.3. Cardiology

- **R64.** Patients with known or presumed coronary artery disease and high perioperative risk should be managed in an ICU setting for the first 24 to 48 hours postoperatively **(Grade D)**.

- **R65.** Therapy with β-adrenergic blocking agents should be considered perioperatively for cardioprotection **(Grade D)**.

8.5.4. Pulmonary

- **R66.** Appropriate pulmonary management includes aggressive pulmonary toilet and incentive spirometry, oxygen supplementation to avoid hypoxemia, and early institution of continuous positive airway pressure when clinically indicated **(Grade D)**.

- **R67.** Prophylaxis against DVT is recommended for all patients **(Grade B; BEL 2 [randomized])** and may be continued until patients are ambulatory **(Grade D)**. Early ambulation is encouraged **(Grade C; BEL 3)**.

- **R68.** Currently recommended prophylactic regimens include sequential compression devices **(Grade C; BEL 3)**, as well as subcutaneously administered unfractionated heparin or low-molecular-weight heparin for 3 days before and after bariatric surgery **(Grade B; BEL 2 [randomized])**, and inferior vena cava filter placement in patients at high risk for mortality after pulmonary emboli or DVT **(Grade C; BEL 3)**, with known pulmonary artery pressure exceeding 40 mm Hg **(Grade D)**, or those with known hypercoagulable states **(Grade C; BEL 3)**.

- **R69.** Respiratory distress or failure to wean from ventilatory support should raise suspicion and prompt an evaluation for an acute postoperative complication, such as pulmonary embolus or anastomotic leak **(Grade D)**.

8.5.5. Monitoring for Surgical Complications

- **R70.** In the clinically stable patient, meglumine diatrizoate (Gastrografin) upper gastrointestinal studies or computed tomography (CT) may identify anastomotic leaks **(Grade C; BEL 3)**.

- **R71.** Exploratory laparotomy is recommended in the setting of high clinical suspicion for anastomotic leaks despite a negative study **(Grade C; BEL 3)**.

- **R72.** The presence of a new sustained pulse rate of more than 120 beats/min for longer than 4 hours should raise suspicion for an anastomotic leak **(Grade D)**.

- **R73.** A routine Gastrografin upper gastrointestinal study may be considered to identify any subclinical leaks before discharge of the patient from the hospital **(Grade C; BEL 3)**.

8.5.6. Fluid Management

- **R74.** The goals of fluid management during the early postoperative period after bariatric surgery are maintaining a urine output of more than 40 mL/h, avoiding volume overload, maintaining normal serum electrolyte levels, and limiting dextrose-containing solutions to avoid hyperglycemia **(Grade D)**.

- **R75.** Postoperative urine output must be monitored, with a target of more than 30 mL/h or 240 mL per 8-hour shift **(Grade D)**.

8.5.7. Preventing Rhabdomyolysis

- **R76.** Patients should have adequate padding at all pressure points during bariatric surgery **(Grade D)**.

- **R77.** When rhabdomyolysis is suspected, creatine kinase levels should be determined **(Grade C; BEL 3)**.

8.5.8. Anemia

- **R78.** The indications for transfusions of blood products after bariatric surgery are the same as for other surgical procedures **(Grade D)**.

- **R79.** Persistence of anemia without evidence of blood loss should be evaluated in terms of nutritional deficiencies during the late postoperative period **(Grade D)**.

8.6. Late Postoperative Management (≥5 Days)

8.6.1. Follow-up

- **R80.** The frequency of follow-up depends on the bariatric procedure performed and the severity of comorbidities **(Grade D)** (Table 12).

8.6.2. Weight Loss

- **R81.** Inadequate weight loss should prompt evaluation for (*1*) surgical failure with loss of integrity of the gastric pouch in gastroplasty or RYGB procedures, (*2*) a poorly adjusted gastric band, and (*3*) development of maladaptive eating behaviors or psychologic complications **(Grade B; BEL 2 [randomized])**.

- **R82.** The assessment of inadequate weight loss after bariatric surgery should include imaging studies to determine the integrity of the gastric pouch, ascertainment of the patient's understanding of the meal plan and compliance, and psychologic evaluation **(Grade D)**.

- **R83.** Inadequate weight loss after a bariatric procedure without resolution or a recurrence of a major comorbidity may necessitate a surgical revision, such as con-

Table 12
Consensus for Follow-up Nutrition and Metabolic Consultations After Bariatric Surgery, Stratified by Type of Procedure Performed and Presence of Comorbidities (Grade D)[a,b]

Procedure	Nutritional or metabolic comorbidities	First 6 months[c]	Second 6 months	Next year	Thereafter
VBG	No	q 3-6 mo	Once	Annually	Annually
	Yes	q 1-2 mo	Twice	q 6 mo	Annually
LAGB	No	q month prn	Once	Annually	Annually
	Yes	q month prn	Twice	q 6 mo	Annually
RYGB	No	q 2-3 mo	Once	q 6 mo	Annually
	Yes	q 1-2 mo	q 3-6 mo	q 6 mo	Annually
BPD/DS	No	q 2-3 mo	Twice	q 3-6 mo	Annually
	Yes	q 1-2 mo	q 6-12 mo	q 6-12 mo	q 6-12 mo

[a] BPD/DS = biliopancreatic diversion with duodenal switch; LAGB = laparoscopic adjustable gastric band; prn = as the circumstances require; q = every; RYGB = Roux-en-Y gastric bypass; VBG = vertical banded gastroplasty.
[b] These consultations are to be performed by a physician with expertise in nutritional and metabolic medicine.
[c] The first follow-up visit is within the first postoperative month. Subsequent visit frequency depends on the severity of any complications and behavioral issues. After years 1 to 3, intestinal adaptation occurs, and metabolic derangements and weight loss should stabilize.

version of a LAGB to either a RYGB or a BPD/DS **(Grade D)**.

8.6.3. Metabolic and Nutritional Management

- **R84.** In those patients without complete resolution of their T2DM, hyperlipidemia, or hypertension, continued surveillance and management should be guided by currently accepted practice guidelines for those conditions **(Grade D)**.

- **R85.** In those patients in whom T2DM, hyperlipidemia, and hypertension have resolved, continued surveillance should be guided by recommended screening guidelines for the specific age-group **(Grade D)**.

- **R86.** Patients who have undergone RYGB, BPD, or BPD/DS and who present with postprandial hypoglycemic symptoms that have not responded to nutritional manipulation should undergo evaluation for the possibility of endogenous hyperinsulinemic hypoglycemia **(Grade C; BEL 3)**.

- **R87.** Routine metabolic and nutritional monitoring is recommended after all bariatric surgical procedures **(Grade A; BEL 1)**.

- **R88.** Patients should be advised to increase their physical activity (aerobic and strength training) to a minimum of 30 minutes per day as well as increase physical activity throughout the day as tolerated **(Grade D)**.

- **R89.** All patients should be encouraged to participate in ongoing support groups after discharge from the hospital **(Grade D)**.

8.6.3.1. Association of malabsorptive surgical procedures with nutritional deficiencies

- **R90.** The frequency and recommended nutritional surveillance in patients who have had a malabsorptive bariatric procedure are outlined in Table 13 **(Grade C; BEL 3)**.

- **R91.** The recommended empiric vitamin and mineral supplementation after malabsorptive bariatric surgery is outlined in Table 14 **(Grade B; BEL 2 [randomized and nonrandomized])**.

8.6.3.2. Protein depletion and supplementation

- **R92.** Protein intake should be quantified periodically **(Grade D)**.

- **R93.** Ideally, protein intake with meals, including protein supplementation, should be in the range of 80 to

Table 13
Recommended Biochemical Surveillance of Nutritional Status After Malabsorptive Bariatric Surgical Procedures[a]

Surveillance factor	Roux-en-Y gastric bypass	Biliopancreatic diversion (± duodenal switch)
Time interval		
1st year	Every 3-6 mo	Every 3 mo
Thereafter	Annually	Every 3-6 mo depending on symptoms
Laboratory tests	CBC, platelets	CBC, platelets
	Electrolytes	Electrolytes
	Glucose	Glucose
	Iron studies, ferritin	Iron studies, ferritin
	Vitamin B_{12} (MMA, HCy optional)	Vitamin B_{12} (MMA, HCy optional)
	Liver function (GGT optional)	Liver function (GGT optional)
	Lipid profile	Lipid profile
	25-Hydroxyvitamin D	Albumin and prealbumin
	Optional:	RBC folate
	Intact PTH	Fat-soluble vitamins (6-12 mo)
	Thiamine	Vitamin A
	RBC folate	25-Hydroxyvitamin D
		Vitamin E
		Vitamin K_1 and INR
		Metabolic bone evaluation[b]
		Intact PTH (6-12 mo)
		24-h urine calcium (6-12 mo)
		Urine N-telopeptide (annually)
		Osteocalcin (as needed)
		Metabolic stone evaluation (annually)
		24-h urine calcium, citrate, uric acid, and oxalate
		Trace elements (annually or as needed)
		Zinc
		Selenium
		Miscellaneous (as needed)
		Carnitine
		Essential fatty acid chromatography

[a] CBC = complete blood cell count; GGT = γ-glutamyltransferase; HCy = homocysteine; INR = international normalized ratio; MMA = methylmalonic acid; PTH = parathyroid hormone; RBC = red blood cell.
[b] Dual-energy x-ray absorptiometry should be performed annually to monitor bone density **(Grade D)**.

120 g/d for patients with a BPD or BPD/DS and 60 g/d or more for those with RYGB **(Grade D)**.

- **R94.** In patients with severe protein malnutrition not responsive to oral protein supplementation, parenteral nutrition should be considered **(Grade D)**.

8.6.3.3. Skeletal and mineral homeostasis, including nephrolithiasis

- **R95.** Recommended laboratory tests for the evaluation of calcium and vitamin D metabolism and metabolic bone disease in patients who have undergone RYGB, BPD, or BPD/DS are outlined in Table 15 **(Grade D)**.

Table 14
Routine Nutrient Supplementation After Bariatric Surgery[a]

Supplement	Dosage
Multivitamin	1-2 daily
Calcium citrate with vitamin D	1,200-2,000 mg/d + 400-800 U/d
Folic acid	400 µg/d in multivitamin
Elemental iron with vitamin D[b]	40-65 mg/d
Vitamin B_{12}	≥350 µg/d orally or 1,000 µg/mo intramuscularly or 3,000 µg every 6 mo intramuscularly or 500 µg every week intranasally

[a] Patients with preoperative or postoperative biochemical deficiency states are treated beyond these recommendations.
[b] For menstruating women.

- **R96.** In patients who have undergone RYGB, BPD, or BPD/DS, treatment with orally administered calcium, ergocalciferol (vitamin D_2), or cholecalciferol (vitamin D_3) is indicated to prevent or minimize secondary hyperparathyroidism without inducing frank hypercalciuria **(Grade C; BEL 3)**.

- **R97.** In cases of severe vitamin D malabsorption, oral doses of vitamin D_2 or D_3 may need to be as high as 50,000 to 150,000 U daily, and more recalcitrant cases may require concurrent oral administration of calcitriol (1,25-dihydroxyvitamin D) **(Grade D)**.

- **R98.** In patients with RYGB, BPD, or BPD/DS, bone density measurements with use of dual-energy x-ray absorptiometry may be indicated to monitor for the development or presence of osteoporosis at baseline, in addition to a follow-up study at about 2 years, in accordance with the recommendations from the International Society for Clinical Densitometry (http://www.iscd.org/Visitors/positions/OfficialPositionsText.cfm?fromhome=1) and the National Osteoporosis Foundation (http://www.nof.org/osteoporosis/bonemass.htm) **(Grade D)**.

- **R99.** Bisphosphonates approved by the US Food and Drug Administration may be a consideration in bariatric surgery patients with osteoporosis (*T* score −2.5 or below for the hip or spine) only after adequate and appropriate evaluation and therapy for calcium and vitamin D insufficiency. This evaluation should include and confirm a normal parathyroid hormone level, 25-hydroxyvitamin D level of 30 to 60 ng/mL, normal serum calcium level, normal phosphorus level, and 24-hour urine calcium excretion between about 70 and 250 mg/24 h. Therapy considerations should be based on the National Osteoporosis Foundation-World Health Organization 2008 Guidelines (http://www.nof.org/professionals/NOF_Clinicians%20_Guide.pdf). If therapy is indicated, then intravenously administered bisphosphonates should be used if concerns exist about adequate oral absorption and potential anastomotic ulceration with use of orally administered bisphosphonates **(Grade C; BEL 3)**.

- **R100.** Recommended dosages of orally administered bisphosphonates in bariatric surgery patients with osteoporosis include the following: alendronate, 70 mg/wk; risedronate, 35 mg/wk or two 75-mg tablets/mo; or ibandronate, 150 mg/mo. Recommended intravenous dosages of bisphosphonates are as follows: zoledronic acid, 5 mg once a year, or ibandronate, 3 mg every 3 months **(Grade D)**.

- **R101.** There are insufficient data to recommend empiric supplementation of magnesium after bariatric surgery beyond what is included in a mineral-containing multivitamin that provides the daily recommended intake of magnesium (>300 mg in women; >400 mg in men) **(Grade D)**.

- **R102.** Oral phosphate supplementation may be provided for mild to moderate hypophosphatemia (1.5 to 2.5 mg/dL), which is usually due to vitamin D deficiency **(Grade D)**.

- **R103.** Management of oxalosis and calcium oxalate stones includes avoidance of dehydration, a low oxalate meal plan, and oral calcium and potassium citrate therapy **(Grade D)**.

- **R104.** Probiotics containing *Oxalobacter formigenes* have been shown to improve renal oxalate excretion and improve supersaturation levels and may therefore be used as well **(Grade C; BEL 3)**.

8.6.3.4. Fat and fat-soluble vitamin malabsorption

- **R105.** The routine use of serum fatty acid chromatography to detect essential fatty acid deficiency is not cost-effective and should not be performed because this deficiency has not been reported **(Grade D)**.
- **R106.** Routine supplementation of vitamin A is usually not necessary after RYGB or purely restrictive procedures **(Grade C; BEL 3)**.
- **R107.** In contrast, routine screening for vitamin A deficiency is recommended, and supplementation is often needed after malabsorptive bariatric procedures, such as BPD or BPD/DS **(Grade C; BEL 3)**.

Table 15
Diagnostic Testing and Management for Skeletal and Mineral Disorders in Patients Who Have Undergone Roux-en-Y Gastric Bypass, Biliopancreatic Diversion, or Biliopancreatic Diversion With Duodenal Switch[a]

Condition	Diagnostic testing	Management
Metabolic bone disease	Serum calcium, phosphorus, magnesium 25-Hydroxyvitamin D Bone-specific alkaline phosphatase (or osteocalcin) Intact parathyroid hormone Spot urine or serum N-telopeptide 24-Hour urine calcium excretion 1,25-Dihydroxyvitamin D (if renal compromise) Vitamin A and K_1 levels Albumin and prealbumin Dual-energy x-ray absorptiometry (at 3 sites) at baseline and 2-year follow-up per ISCD and NOF recommendations[c]	Calcium citrate or gluconate Vitamin D_2 or D_3 orally Calcitriol orally Vitamin D intramuscularly (if available) Alendronate, ibandronate, or risedronate orally Ibandronate, pamidronate, or zoledronate intravenously[b] Calcitonin intranasally Human recombinant parathyroid hormone where appropriate
Nephrolithiasis	Urinalysis 24-Hour urine specimen for calcium, oxalate, citrate Renal ultrasonography	Low oxalate diet Calcium orally Cholestyramine Potassium citrate Lithotripsy Urologic surgery

[a] ISCD = International Society for Clinical Densitometry; NOF = National Osteoporosis Foundation; WHO = World Health Organization.

[b] Intravenously administered bisphosphonates may cause hypocalcemia and hypophosphatemia and should be used cautiously—only after documenting calcium and vitamin D sufficiency and with aggressive calcium and vitamin D supplementation. With intravenous bisphosphonate use, serum calcium and phosphate levels should be monitored. Intravenously administered pamidronate is not approved by the US Food and Drug Administration for osteoporosis prevention or treatment. See NOF-WHO 2008 guidelines (http://www.nof.org/professionals/NOF_Clinicians%20_Guide.pdf).

[c] ISCD (see http://www.iscd.org/Visitors/positions/OfficialPositionsText.cfm?fromhome=1); NOF (see http://www.nof.org/osteoporosis/bonemass.htm).

- **R108.** Supplementation may be provided with use of vitamin A alone or in combination with the other fat-soluble vitamins (D, E, and K) **(Grade C; BEL 3)**.

- **R109.** The value of routine screening for vitamin E or K deficiencies has not been documented for any bariatric procedure, including BPD and BPD/DS **(Grade C; BEL 3)**.

- **R110.** In the presence of an established fat-soluble vitamin deficiency with hepatopathy, coagulopathy, or osteoporosis, assessment of a vitamin K_1 level should be considered in an effort to detect a deficiency state **(Grade D)**.

8.6.3.5. Iron, vitamin B_{12}, folic acid, and selenium deficiencies; the nutritional anemias

- **R111.** Iron status should be monitored in all bariatric surgery patients and then appropriately treated as in any medical or surgical patient **(Grade D)**.

- **R112.** Orally administered ferrous sulfate, fumarate, or gluconate (320 mg twice a day) may be needed to prevent iron deficiency in patients who have undergone a malabsorptive bariatric surgical procedure, especially in menstruating women **(Grade A; BEL 1)**.

- **R113.** Vitamin C supplementation should be considered in patients with recalcitrant iron deficiency because vitamin C can increase iron absorption and ferritin levels **(Grade C; BEL 3)**.

- **R114.** Intravenous iron infusion with iron dextran, ferric gluconate, or ferric sucrose may be needed if oral iron supplementation is ineffective at correcting the iron deficiency **(Grade D)**.

- **R115.** Evaluation for vitamin B_{12} deficiency is recommended in all bariatric surgery patients **(Grade B; BEL 2 [nonrandomized])**.

- **R116.** Oral supplementation with crystalline vitamin B_{12} at a dosage of 350 μg daily or more or intranasally administered vitamin B_{12}, 500 μg weekly, may be used to maintain vitamin B_{12} levels **(Grade B; BEL 2 [nonrandomized])**.

- **R117.** Parenteral supplementation with either 1,000 μg of vitamin B_{12} monthly or 1,000 to 3,000 μg every 6 to 12 months is necessary if vitamin B_{12} sufficiency cannot be maintained by means of oral supplementation **(Grade C; BEL 3)**.

- **R118.** Assessment of vitamin B_{12} status should be done annually in patients who have undergone RYGB or BPD/DS **(Grade D)**.

- **R119.** Folic acid supplementation (400 μg/d) is provided as part of a routine multivitamin preparation **(Grade B; BEL 2 [randomized and nonrandomized])**.

- **R120.** Folic acid supplementation should be provided in all women of childbearing age because of the risk of fetal neural tube defects with folic acid deficiency **(Grade A; BEL 1)**.

- **R121.** Nutritional anemias resulting from malabsorptive bariatric surgical procedures might also involve deficiencies in protein, copper, and selenium, necessitating evaluation of these nutrients when routine screening for iron, vitamin B_{12}, and folic acid deficiencies is negative **(Grade C; BEL 3)**.

- **R122.** There are insufficient data to support routine screening for selenium deficiency or empiric selenium supplementation in patients after a bariatric surgical procedure **(Grade D)**.

- **R123.** In patients treated with BPD or BPD/DS who have unexplained anemia or fatigue, persistent diarrhea, cardiomyopathy, or metabolic bone disease, selenium levels should be checked **(Grade C; BEL 3)**.

8.6.3.6. Zinc and thiamine

- **R124.** Because zinc deficiency has been described, physicians should routinely screen for it after BPD or BPD/DS, while bearing in mind that plasma zinc levels are unreliable in the presence of systemic inflammation **(Grade C; BEL 3)**.

- **R125.** There is inadequate clinical evidence to recommend empiric zinc supplementation after bariatric surgery **(Grade D)**.

- **R126.** All bariatric surgery patients should be provided with an oral multivitamin supplement that contains thiamine **(Grade D)**.

- **R127.** Routine screening for thiamine deficiency or additional empiric thiamine treatment (or both) is not recommended in bariatric surgery patients who are already routinely receiving a multivitamin supplement that contains thiamine **(Grade C; BEL 3)**.

- **R128.** Patients with protracted vomiting should be screened for thiamine deficiency **(Grade C; BEL 3)**.

- **R129.** In patients with persistent vomiting after *any* bariatric procedure, aggressive supplementation with thiamine is imperative; intravenously administered glucose should be provided judiciously in this situation because it can aggravate thiamine deficiency **(Grade C; BEL 3)**.

- **R130.** In patients presenting with neurologic symptoms suggestive of thiamine deficiency (that is, Wernicke encephalopathy and peripheral neuropathy), aggressive parenteral supplementation with thiamine (100 mg/d) should be administered for 7 to 14 days **(Grade C; BEL 3)**.

- **R131.** Subsequent oral thiamine supplementation (100 mg/d) should be continued until neurologic symptoms resolve **(Grade C; BEL 3)**.

8.6.4. Cardiology and Hypertension

- **R132.** Lipid levels and need for lipid-lowering medications should be periodically monitored and evaluated **(Grade D)**.

- **R133.** Use of antihypertensive medications should be evaluated repeatedly and reduced or discontinued as indicated with the resolution of hypertension **(Grade D)**.

8.6.5. Gastrointestinal Complications

8.6.5.1. Diarrhea

- **R134.** If diarrhea persists, an evaluation should be initiated **(Grade C; BEL 3)**.

- **R135.** Upper endoscopy with small bowel biopsies and aspirates remains the "gold standard" in the evaluation of celiac sprue **(Grade C; BEL 3)** and bacterial overgrowth **(Grade C; BEL 3)**.

- **R136.** Colonoscopy should be performed and a stool specimen should be obtained if the presence of *Clostridium difficile* colitis is suspected **(Grade C; BEL 3)**.

- **R137.** Persistent steatorrhea after BPD or BPD/DS should prompt an evaluation for nutrient deficiencies **(Grade C; BEL 3)**.

8.6.5.2. Stomal stenosis or ulceration after bariatric surgery

- **R138.** Nonsteroidal antiinflammatory drugs should be avoided after bariatric surgery because they have been implicated in the development of anastomotic ulcerations **(Grade C; BEL 3)**.

- **R139.** Alternative pain medication should be identified before bariatric surgery **(Grade D)**.

- **R140.** Persistent and severe gastrointestinal symptoms (such as nausea, vomiting, and abdominal pain) warrant additional evaluation **(Grade C; BEL 3)**.

- **R141.** Upper intestinal endoscopy is the preferred diagnostic procedure because, in many circumstances, upper endoscopy can also incorporate a therapeutic intervention with transendoscopic dilation of a recognized stricture **(Grade C; BEL 3)**.

- **R142.** Evaluation should include *H pylori* testing as a possible contributor to persistent gastrointestinal symptoms after bariatric surgery **(Grade C; BEL 3)**.

- **R143.** Anastomotic ulcers should be treated with H_2 receptor blockers, proton pump inhibitors, sucralfate, antibiotics, and, if *H pylori* is identified, multiple antibiotics and bismuth **(Grade C; BEL 3)**.

- **R144.** Patients who previously underwent a RYGB with a nonpartitioned stomach and develop a gastrogastric fistula should undergo revisional RYGB to separate the upper and lower gastric pouches **(Grade D)**.

- **R145.** Persistent vomiting, regurgitation, and upper gastrointestinal obstruction after LAGB should be treated with immediate removal of all fluid from the adjustable band **(Grade D)**.

- **R146.** Persistent symptoms of gastroesophageal reflux, regurgitation, chronic cough, or recurrent aspiration pneumonia after LAGB are all problems suggestive of the band being too tight or the development of an abnormally large gastric pouch above the band. These symptoms should prompt immediate referral back to the surgeon **(Grade D)**.

8.6.5.3. Gallbladder disease

- **R147.** Oral administration of ursodiol (300 mg twice a day) for 6 months postoperatively may be considered in patients not undergoing a prophylactic cholecystectomy **(Grade A; BEL 1)**.

- **R148.** There is a debate regarding performance of cholecystectomy for known gallstones at the time of RYGB, BPD, or BPD/DS procedures. There is no consensus regarding the need to perform cholecystectomy at the time of bariatric operations **(Grade C; BEL 3)**.

8.6.5.4. Bacterial overgrowth

- **R149.** Although uncommon, suspected bacterial overgrowth in the biliopancreatic limb after BPD or BPD/DS should be treated empirically with metronidazole **(Grade C; BEL 3)**.

- **R150.** For antibiotic-resistant cases of bacterial overgrowth, probiotic therapy with *Lactobacillus plantarum* 299v and *Lactobacillus* GG may be considered **(Grade D)**.

8.6.6. Incisional Hernias

- **R151.** Repair of asymptomatic hernias should be deferred until weight loss has stabilized and nutritional

status has improved, to allow for adequate healing (12 to 18 months after bariatric surgery) **(Grade D)**.

- **R152.** Incarcerated incisional or umbilical hernias in conjunction with abdominal pain necessitates aggressive surgical correction because of the risk of bowel infarction **(Grade C; BEL 3)**.

8.6.7. Bowel Obstruction From Adhesions or Internal Hernias

- **R153.** Patients with cramping periumbilical pain at any time after RYGB, BPD, or BPD/DS should be emergently evaluated with an abdominal and pelvic CT scan to exclude the potentially life-threatening complication of closed-loop bowel obstruction **(Grade D)**.

- **R154.** Exploratory laparotomy or laparoscopy is indicated in patients who are suspected of having an internal hernia because this complication can be missed with upper gastrointestinal studies and CT scans **(Grade C; BEL 3)**.

8.6.8. Body-Contouring Surgery

- **R155.** Body-contouring surgery may be performed after bariatric surgery to manage excess tissue that impairs hygiene, causes discomfort, and is disfiguring **(Grade C; BEL 3)**.

- **R156.** Circumferential torsoplasty or abdominoplasty may be used to remove excess abdominal skin **(Grade D)**.

- **R157.** Breast reduction or lift, arm lift, resection of redundant gluteal skin, and thigh lift can also be pursued **(Grade D)**.

- **R158.** Such procedures are best pursued after weight loss has stabilized (12 to 18 months after bariatric surgery) **(Grade D)**.

- **R159.** Tobacco use must be avoided and nutritional status maintained in bariatric surgery patients undergoing postoperative body-contouring procedures **(Grade A; BEL 1)**.

8.7. Criteria for Hospital Admission After Bariatric Surgery

- **R160.** Severe malnutrition should prompt hospital admission for initiation of nutritional support **(Grade D)**.

- **R161.** The initiation of enteral or parenteral nutrition should be guided by established published criteria **(Grade D)**.

- **R162.** Hospital admission is required for the management of gastrointestinal complications after bariatric surgery in clinically unstable patients **(Grade D)**.

- **R163.** Surgical management should be pursued for gastrointestinal complications not amenable or responsive to medical therapy **(Grade D)**.

- **R164.** If not dehydrated, most patients can undergo endoscopic stomal dilation for stricture as an outpatient procedure **(Grade D)**.

- **R165.** Revision of a bariatric surgical procedure is recommended in the following circumstances: (*1*) presence of medical complications clearly resulting from the surgical procedure and not amenable or responsive to medical therapy (for example, malnutrition) and (*2*) inadequate weight loss or weight regain in patients with persistent weight-related comorbidities who previously underwent a restrictive procedure (for example, vertical banded gastroplasty) **(Grade C; BEL 3)**.

- **R166.** Reversal of a bariatric surgical procedure is recommended when serious complications related to previous bariatric surgery cannot be managed medically and are not amenable to surgical revision **(Grade D)**.

DISCLOSURE

Cochairmen

Dr. Jeffrey I. Mechanick reports that he does not have any relevant financial relationships with any commercial interests.

Dr. Robert F. Kushner reports that he has received Advisory Board honoraria from GI Dynamics, Merck & Co., Inc., and Orexigen Therapeutics, Inc. and speaker honoraria from sanofi-aventis U.S. LLC.

Dr. Harvey J. Sugerman reports that he has received speaker honoraria from Ethicon Endo-Surgery, Inc., consultant fees from EnteroMedics, salary for his role as Editor from *Surgery for Obesity and Related Diseases* (official journal of the American Society for Metabolic & Bariatric Surgery), and salary for his role as Review Committee Chair from Surgical Review Corporation.

American Association of Clinical Endocrinologists Primary Writers

Dr. J. Michael Gonzalez-Campoy reports that he does not have any relevant financial relationships with any commercial interests.

Dr. Maria L. Collazo-Clavell reports that she does not have any relevant financial relationships with any commercial interests.

Dr. Safak Guven requested disclosure information not provided.

Dr. Adam F. Spitz reports that he does not have any relevant financial relationships with any commercial interests.

The Obesity Society Primary Writers

Dr. Caroline M. Apovian reports that she has received research grant support from the Dr. Robert C.

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Dr. Edward H. Livingston reports that he does not have any relevant financial relationships with any commercial interests.

Dr. Robert Brolin reports that he does not have any relevant financial relationships with any commercial interests.

Dr. David B. Sarwer reports that he has received consultant honoraria from Ethicon Endo-Surgery, Inc.

Ms. Wendy A. Anderson reports that she does not have any relevant financial relationships with any commercial interests.

American Society for Metabolic & Bariatric Surgery Primary Writer

Dr. John Dixon reports that he has received speaker honoraria from Allergan, Inc., Bariatric Advantage, Nestle Australia, and Covidien AG, Medical Advisory Board honoraria from Nestle Australia, consultant honoraria from Bariatric Advantage, and consultant honoraria and research grant support from Allergan, Inc.

American Association of Clinical Endocrinologists Nutrition Committee Reviewers

Dr. Elise M. Brett reports that her spouse receives employee salary from Novo Nordisk A/S.

Dr. Osama Hamdy reports that he has received speaker honoraria from Amylin Pharmaceuticals, Inc., Merck & Co., Inc., Novo Nordisk A/S, and Takeda Pharmaceuticals America, Inc.

Dr. M. Molly McMahon reports that she does not have any relevant financial relationships with any commercial interests.

Dr. Yi-Hao Yu reports that he receives employee salary from Bristol-Myers Squibb Company.

The Obesity Society Reviewers

Dr. Ken Fujioka reports that he does not have any relevant financial relationships with any commercial interests.

Ms. Susan Cummings reports that she does not have any relevant financial relationships with any commercial interests.

Dr. Stephanie Sogg reports that she does not have any relevant financial relationships with any commercial interests.

American Society for Metabolic & Bariatric Surgery Reviewers

Dr. Philip R. Schauer requested disclosure information not provided.

Dr. Scott A. Shikora reports that he has received Scientific Advisory Board honoraria from Covidien AG, Ethicon Endo-Surgery, Inc., and Synovis Surgical Innovations (a division of Synovis Life Technologies, Inc.), consultant honoraria from EnteroMedics, and stock options for his role as consultant from BariMD, Inc.

Dr. Jaime Ponce reports that he has received speaker honoraria and consultant fees from Ethicon Endo-Surgery, Inc. and Allergan, Inc., Advisory Board honoraria from Ethicon Endo-Surgery, Inc., and Review Committee member fees from Surgical Review Corporation.

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