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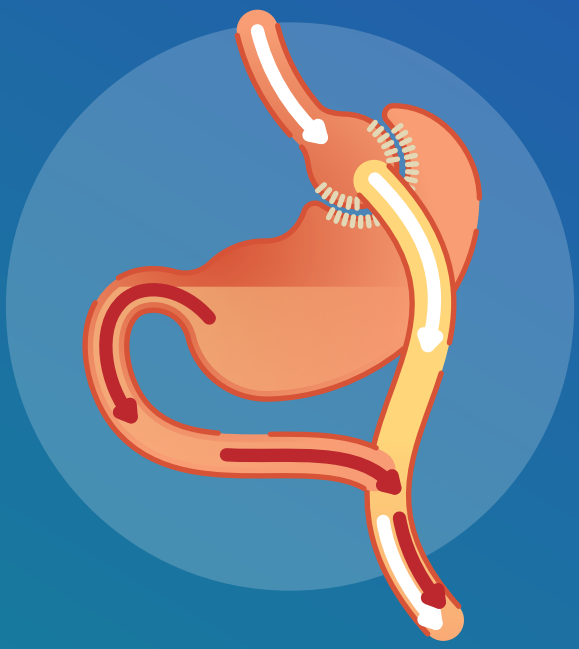

Adult Bariatric Surgery Clinical Nutrition Pathway

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الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

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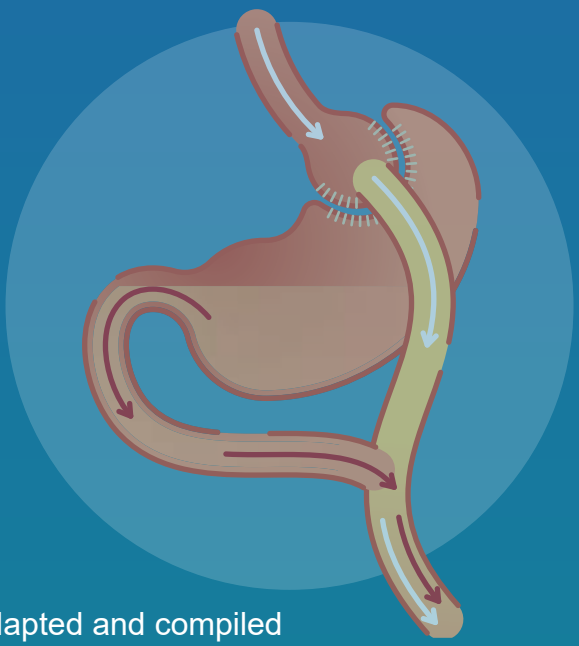

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The information included in this document has been adapted and compiled from various international sources and guidelines.

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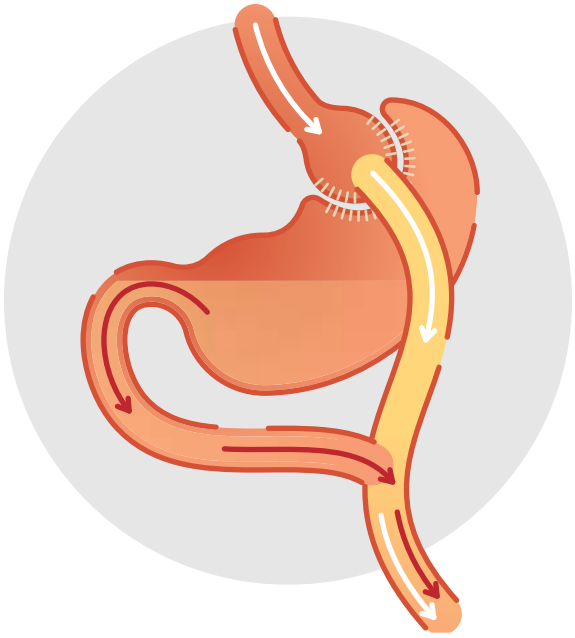

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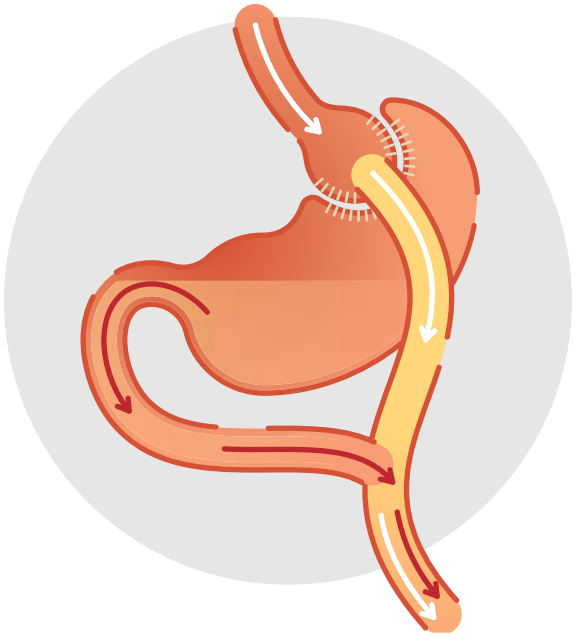

Adiposity, expressed by an elevated body mass index level (BMI) (≥25 kg/m^2), is an established risk factor for mortality and morbidity, primarily of cardiovascular disease, liver cirrhosis, cancer, type 2 diabetes, and adult-onset asthma. Long-term analyses of trends in BMI level have shown that adiposity has increased globally in both genders between 1980 and 2008. In 2013, the Saudi Health Interview Survey reported that the prevalence of obesity was 29% and was expected to continue to increase; the prevalence was also higher in women than in men (33.5% vs. 24.1%, respectively).

Treatment options for obesity have traditionally focused on lifestyle interventions, individualized counseling, and physical activity in addition to diet, and not just on diet alone. In recent years, obesity treatments have trended towards other modalities, including pharmacotherapy interventions, bariatric surgical procedures and more recently, endoscopic bariatric interventions.

A review of 22 randomized controlled trials compared bariatric surgical procedures with lifestyle interventions for obesity (diet, exercise, pharmacotherapy), and showed that surgical management resulted in better weight changes and quality of life and diabetes outcome after follow up.The American Society for Metabolic and Bariatric Surgery reported a total of 252.000 bariatric procedures in 2018, and the figure is expected to rise.

Aim

The goal of this pathway is to provide health care professionals with nutritional guidelines for individuals considered for bariatric surgical procedures.

The ADAPTE process was used, modified to Five Steps as developed by Kristiansen et al, which include:

1. Planning

2. Initial assessment of the recommendations

3. Modification

4. Publication

5. Evaluation

Multiple workshops were conducted over a one-year duration (2019-2020). The Five Steps adaptation process was selected because of its simple and practical approach. The final document was peer-reviewed and edited accordingly.

Adult Bariatric Surgery Clinical Nutrition Pathway

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Pathway 1: Adult bariatric surgery clinical nutrition pathway

Eligibility criteria based on guidelines for bariatric and metabolic surgery

Yes

- BMI 35–≤ 50 kg/m^2
  - If all appropriate non-surgical measures have been tried but have failed to achieve or maintain adequate clinically beneficial weight loss for at least 6 months
- BMI > 50 kg/m^2
  - Bariatric surgery is the 1st line option for patients in whom surgical intervention is considered appropriate

No

Lifestyle modifications including:

- Medical nutrition therapy for weight reduction
- Encouragement of regular physical activity
- Maximum weekly weight loss 0.5–1 kg
- Cognitive behavioral therapy
- ± Pharmacology agents

Nutritional Evaluation:

- Detailed dietary assessment
- Assessment of eating behavior
- Obesity management history
- Assessment of physical activity habits

1. Pre-operative preparation

- Weight reduction program (diets 800–1500 kcal/day) ranged from 2–6 weeks; it may be extended upto 3 months before surgery based on the assessment
- Screening for vitamin deficiency (iron, folate, vitamin D, and B12)
- Any nutritional deficiencies should be corrected prior to surgery
- Psychological assessments

2. Short-term post-operative nutrition care

Type of diet post-surgery (as tolerated)

24–48 hours	Clear liquid diet (in small portions)
3–7 days	Liquid diet (increase as tolerated)
1–2 weeks	Puree diet
2 weeks	Soft diet
1 month	Solid food
2 months	Balanced diet

3. Long-term post-operative nutrition care

- Reassess nutrition related diseases such as diabetes, HTN, and CVD
- Follow up once annually; and assess:
  - Weight loss and free muscle mass
  - Iron, folate levels
  - Vitamin B12, copper, zinc, selenium, thiamine for patient who are at risk
  - Bone health

Follow-up at 3, 6, and 12 months to assess:

- Severe macronutrients deficiency, e.g., protein deficiency (serum albumin <3.5 mg/dL). The clinical manifestations of protein deficiency include hair loss, peripheral edema, and poor wound healing
- Complications associated with malabsorptive surgical procedure
- Routine monitoring for iron, folate, vitamin D, and B12
- For malabsorptive procedures, copper, zinc, vitamin A deficiency should be monitored
- Any adverse events and/or co-morbidities
- Psychological support sessions should be considered

Patient should be instructed to:

- Limit added sugar
- Read labels to learn what foods are high in sugar and avoid them
- Become familiar with foods that are low in fat and choose them instead of full-fat versions
- Read about foods that are high in protein and become very familiar with these
- Practice eating meals slowly, taking smaller bites, and sipping liquids very slowly
- Practice drinking fluids more frequently and in-between meals

Table 1: Stages of meal planning pre- and post-bariatric surgery

	Diet	Duration	Initiation
Stage 1	Pre-op diet	2–6 weeks	Before surgery date
Stage 2	Clear then full liquids	Approximately 1 week	As soon as returning home from the hospital
Stage 3	Pureed (blended)	Approximately 1–2 weeks	Starting at week 3 after surgery; staying on until seeing a dietitian
Stage 4	Soft	Approximately 2 weeks	Starting after seeing a dietitian
Stage 5	Solid	Approximately 1 month	Week 7 after surgery
Stage 6	Balanced	Indefinitely	

Patient should be instructed to:

- Eat at least 4–6 mini-meals per day
- Small frequent meals arenecessary in order to meet the nutritional needs
- Not eating frequent enough can result in minimal or slower weight loss
- Limit the amount of food at each meal to 1/4–1/3 cup
- Limit added sugar to avoid dumping syndrome

Table 2: Nutritional requirements

Nutrients	Requirements	Notes
Protein intake	Women: 50–60 g/day Men: 70–90 g/day OR Up to 1.5 g/kg ideal body weight/day	During the first 6 weeks, protein source may be in the form of a protein drink. Protein target should be split between 3 or 4 meals, aiming for 20 to 30 g per meal. Supplements with high protein powders and drinks may be needed.
Fluid intake	A minimum fluid intake of 48–64 oz/day	Avoid liquids during meals and half an hour after meals to avoid dumping syndrome or flushing of vital nutrients from the new stomach pouch. Drinking fluids immediately before, during, or after meals may cause bloating and low food intake. Adequate fluid intake is necessary especially during times of nausea, vomiting, diarrhea, and exercise. Use caffeine-free drinks for at least 8 weeks after surgery in order to prevent dehydration. Avoid carbonated beverages or sparkling waters at all times.

Table 3: Micronutrient management for patients post-bariatric surgery

Micro-nutrient	Frequency	Routine replacement in addition to 1st line recommended complete multivitamin and mineral supplement	Deficiency
Adjusted calcium & vitamin D	3, 6, and 12 months in first year then annually	**Calcium carbonate** • Combined calcium with vitamin D3 oral supplement	Increase dose/frequency
		Vitamin D (in addition to an oral combined calcium with vitamin D3 supplement): • Colecalciferol 20,000 units once weekly oral or • Colecalciferol 3,200 units once daily oral or • Ergocalciferol 300,000 units 3–6 monthly intramuscular (IM)	
Parathyroid Hormone	PTH yearly for 2 years only		
Ferritin & iron	3, 6, and 12 months in first year then annually	**Iron** - Consider routine replacement • Ferrous fumarate 210 mg once daily oral or • Ferrous sulphate 200 mg once daily oral or • Ferrous gluconate 300 mg twice daily oral	Increase dose/frequency or Consider iron infusion
Vitamin B12		**Vitamin B12** • Cyanocobalamin 500–1000 mcg once daily oral (bought over the counter from a reliable source) or • Hydroxocobalamin 1 mg 3-monthly intramuscular	Increase dose/frequency or Consider a 2-week hydroxocobalamin IM loading course followed by routine maintenance
Folate		**Folic acid** In multivitamin	Folic acid 400 mcg once daily oral (correct B12 first if low)
Zinc Copper Selenium	Yearly for 2 years only	In multivitamin	Zinc with copper supplement (8–15 mg zinc/1 mg copper ratio) Selenium - 3 Brazil nuts once a day
Magnesium Chromium	Not routinely		Discuss with physician
Vitamin A, E, K			Discuss with physician
Thiamine	Not routinely		If prolonged vomiting, additional thiamine 200–300 mg daily, or if oral not tolerable, immediate IV thiamine.

The above is a guide only; please discuss patients with hepatic or renal disease or who are pregnant with the obesity physicians.

*Ref: Imperial Weight Centre micronutrient management for patients after obesity surgery, NHS trust.

BOMSS Guidelines

Table 4: Review of case examples

Case 1	Case 2
A 23-year-old male with morbid obesity. His body weight was 118 kg and height 163 cm, and BMI 44 kg/m^2. Patient tried different types of diet for weight reduction but failed to maintain weight loss. He has strong family history of diabetes and cardiovascular diseases. **Patient medical history:** no medical conditions **Exam:** vital signs were normal **BP:** 125/75 mmHg **Laboratory test results:** no evidence of nutrient deficiency **Plan:** for bariatric surgery Referred to dietician for weight lost pre-surgery and nutrition education	A 38-year-old female with morbid obesity, type 2 diabetes for 6 years and hypothyroidism on thyroxin. Her body weight was 96 kg and height 158 cm, and BMI 38 kg/m^2. Patient tried different types of diets for weight reduction but failed to maintain weight loss. **Exam:** vital signs were normal **BP:** 137/85 mmHg **Laboratory test results:** evidence of hyperglycemia, hypertriglyceridemia and low Hb 8.8 mmol/L and low vitamin D (35 ng/mL) **Plan:** for sleeve gastrectomy, control BG levels Referred to dietician for nutrition education
Dietician evaluation:	**Dietician evaluation:**
Patient is obese since he was 10 years old Good appetite and no GI problem Poor dietary habits Low physical activity Poor sleeping pattern Poor water intake (<1.5 L per day) Ideal body weight = 60 kg, adjusted body weight = 75 kg Total Energy Requirement = 2000–2200 kcal Average total energy intake is 2000–3000 kcal	Good appetite and no GI problem Irregular meal plan Poor physical activity Poor sleeping pattern Poor water intake (<1.5 L per day) Ideal body weight = 56 kg, adjusted body weight = 66 kg Total Energy Requirement = 1700–1800 kcal The total energy intake is around 2000 kcal
Nutrition plan:	**Nutrition plan:**
1500 weight reduction diet for 4 weeks Increase protein intake 75 g/day Provide pre-bariatric surgery dietary instructions Increase fluid 2–3 L per day Encourage increase physical activity No signs for a need to multivitamin supplementation Discuss post-bariatric surgery dietary plans	1000 weight reduction diet for 2 weeks Increase protein intake 50 g/day Provide pre-bariatric surgery dietary instructions Increase fluid 2–3 L per day Encourage increase physical activity Multivitamin + iron supplementation Vitamin D supplementation Discuss post-bariatric surgery dietary plans

Clear liquid diet

Clear liquid diet consists of clear fluids and foods that are liquid at body temperature and leave little undigested material (called residue) in the colon. Permitted foods include clear or pulp-free fruit juices, carbonated beverages, clear meat and vegetable broths, fruit flavored or unflavored gelatin, fruit ices made from clear juices, frozen juice bars, and plain hard candy.

Liquid diet

A liquid diet that includes clear liquids, milk, yogurt, ice cream, and liquid nutritional supplements (such as Ensure).

Puree diet

Includes only pureed foods. Milk products: milk, smooth yogurt, pudding. Fruits: pureed fruits and juices without pulp, skin, seeds, or chunks; well-mashed fresh bananas; apple sauce. Vegetables: pureed cooked vegetables without seeds or skins, mashed potatoes, pureed potatoes with gravy. Meats and meat substitutes: pureed meats (with gravy), pureed casseroles (with broth), hummus or other pureed legume spread. Breads and cereals: smooth cooked cereals such as cream of wheat, slurried breads and pancakes, pureed rice, and pasta.

Soft diet

Mechanical soft diets may include solid foods that are mashed, minced, ground, or soft. A transitional diet between soft and solid foods. Milk products: milk, yogurt with soft fruit, pudding, cottage cheese. Fruits: canned or cooked fruits without seeds or skin, fruit juices with small amounts of pulp, ripe bananas. Vegetables: soft, well-cooked vegetables that are not rubbery or fibrous; well-cooked, moist potatoes. Meats and meat substitutes: ground, minced, or tender meat, poultry, or fish with gravy or sauce; tofu; well-cooked legumes; scrambled eggs. Breads and cereals: cooked cereals or moistened dry cereals with minimal texture, soft pancakes or breads, well-cooked noodles or dumplings in sauce or gravy.

Solid food

May contain protein (fish, leanmeats, and eggs), fat, and complex carbohydrates (bread, potatoes, and vegetables). Depending on the amount of food tolerated, the patient progresses to five or six small meals per day. The patient should avoid sweets and sugars, because they increase osmolarity in the small intestine and potentiate the dumping syndrome.

Balanced diet

A well-balanced diet that depends on all food groups. Supplies a variety of foods to ensure adequacy for all essential nutrients. All food groups should be included, and none should be over emphasized.

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