دانشگاه علوم پزشکی و خدمات بهداشتی درمانی ارومیه

مرکز تحقیقات سلامت مواد غذایی و آشامیدنی

مدیریت تغذیه در انواع جراحی های چاقی

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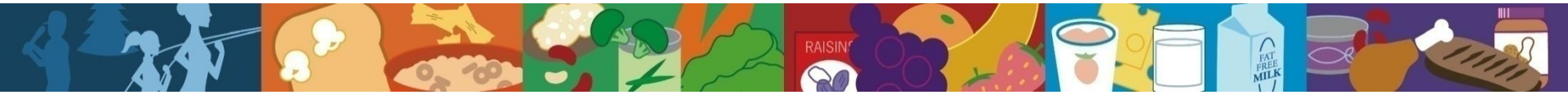
دکتری تخصصی (Ph.D) علوم تغذیه

استاد گروه علوم تغذیه



DEFINITIONS AND BACKGROUND

- Morbid obesity
- bariatric surgery is a viable option for long-term weight loss and improved health risks
- Bariatric surgery changes the enterohepatic circulation of bile acid, with increased plasma bile levels and altered bile acid composition.

DEFINITIONS AND BACKGROUND

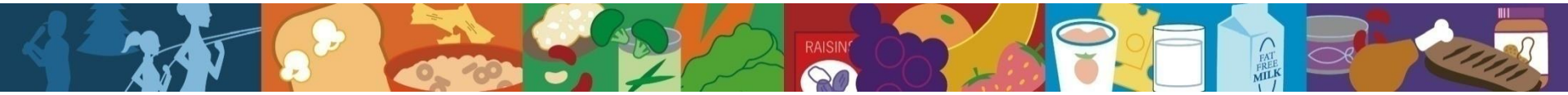
- The bile acid-activated transcription factor Farnesoid X receptor (FXR) targets downstream mediators, such as the gut-derived peptide fibroblast growth factor (FGF) 15/19, which contributes to the beneficial effects of bariatric surgery

DEFINITIONS AND BACKGROUND

- Adult candidates:
  - 45.5 kg or more over their ideal weight range
  - a BMI greater than 40 or
  - a BMI greater than 35 with one or more obesity-related comorbidities

DEFINITIONS AND BACKGROUND

- Adolescents
  - Tried unsuccessfully for at least 6 months to lose weight
  - a BMI greater than 40
  - Have reached their adult height (about age 13 years for girls and 15 years for boys)
  - Have one or more serious health problems

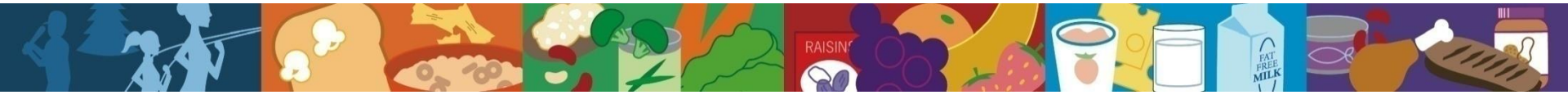


DEFINITIONS AND BACKGROUND

- Optimal outcomes for patients are achieved with a bariatric surgery Center of Excellence with a multidisciplinary approach.
- Protocols, preprinted orders, discharge home instruction sheets, and daily guidelines are important considerations.

DEFINITIONS AND BACKGROUND

- Bariatric surgery is based on major anatomic rearrangements in the GI tract, with functional and taxonomic changes in gut microbial communities
- Bile acid metabolic pathways, GI hormones, luminal contents, energy balance, gut mucosal integrity, and the gut microbiota are significantly modulated after bariatric surgery



DEFINITIONS AND BACKGROUND

- Most patients lose more than 60% of their excess weight after bariatric surgery, at a rate of 4.5 to 9.1 kg per month.
- Expected long-term outcomes include improvement or resolution of diabetes,…

DEFINITIONS AND BACKGROUND

- Various bariatric surgeries
- Restrictive: laparoscopic adjustable gastric band, vertical banded gastroplasty, and sleeve gastrectomy
- Primarily restrictive with a malabsorptive component: Rouxen-Y gastric bypass
- Malabsorptive: biliopancreatic diversion without or with duo -denal switch

LAPAROSCOPIC ADJUSTABLE GASTRIC BAND

- inflatable silicone rubber band to divide the stomach into two parts by wrap ping a band around the upper part and tightening it like a belt.
- LAGB surgery is simple and has a low complication rate.
- lowest risk for vitamin and mineral deficiencies, although folic acid deficiency may occur.

LAPAROSCOPIC ADJUSTABLE GASTRIC BAND

- Advantages
  - reduction in the amount of food the stomach can hold.
  - It induces excess weight loss of 40% to 50%
  - requires no cutting or rerouting within the GI tract,
  - requires only a short hospital stay (1 day)
  - reversible and adjustable

LAPAROSCOPIC ADJUSTABLE GASTRIC BAND

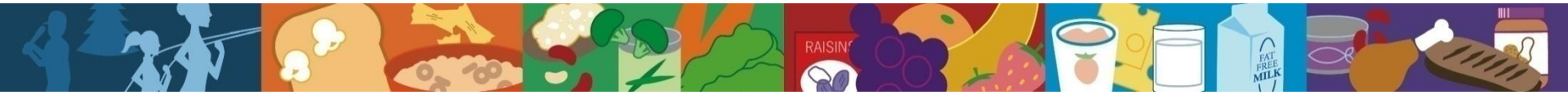
- Disadvantages
  - slower and lower total weight loss
  - a foreign device that remains in the body
  - possible band slippage or band erosion
  - mechanical problems
  - dilation of the esophagus in overeating.
  - Requires strict adherence to a diet
  - has the highest rate of reoperation

VERTICAL SLEEVE GASTRECTOMY

- a laparoscopic tool is inserted through small incisions during the procedure.
- Approximately 75% of the stomach is surgically removed

VERTICAL SLEEVE GASTRECTOMY

- Advantages
  - restriction of the amount of food consumed
  - rapid and significant weight loss
  - no foreign objects or rerouting
  - hospital stay of 2 days
  - weight loss of more than 50% over 3 to 5 years or longer
  - favorable changes in gut hormones.
  - proves insulin sensitivity within 6 months
  - the major driver of the improvement in insulin
  - sensitivity is the secretion of glucagon-like peptide 1



VERTICAL SLEEVE GASTRECTOMY

- Disadvantages
  - an irreversible procedure
  - has a high early complication rate
  - Stricture, ulcer ation, or staple-line leakage
  - potential for long-term vitamin deficiencies because VSG decreases the production of hydrochloric acid and intrinsic factor: iron and vitamin B12 deficiences
  - Thiamin deficiency (Wernicke-Korsakoff syndrome)
  - long-term deficiencies in iron, folate, and vitamin D

ROUX-EN-Y GASTRIC BYPASS

- surgeon staples the smaller, upper part of the stomach, separating it from the rest of the stomach. The small intestine is rerouted and connected to the smaller stomach pouch.
- RYGB procedures reduce the stomach capacity to 40 to 60 mL and induce physiological and neuroendocrine changes that affect the weight regulatory centers in the brain.

ROUX-EN-Y GASTRIC BYPASS

- Because gallstones are common after RYGB surgery, cholecystectomy may be done at the same time as the bariatric procedure.

ROUX-EN-Y GASTRIC BYPASS

- Advantages
  - long-term weight loss (60% to 80% of excess weight)
  - restriction of food intake
  - possible increases in energy expenditure
  - changes in gut hormones that reduce appetite and enhance satiety
  - Typical maintenance of the loss of at least 50% of excess weight.

ROUX-EN-Y GASTRIC BYPASS

- Disadvantages
  - more complex operation
  - longer hospital stay
  - lifelong adherence to dietary and vitamin-mineral supplementation with follow-up compliance.
  - potential deficiencies of thiamin; vitamins B12, D, and K; folate; iron; and calcium.
  - Secondary hyperparathyroidism and vitamin D deficiency after RYGB can be severe
  - Bone loss is common, likely from hormonal and metabolic changes
  - Laparoscopic RYGB has fewer side effects, but anastomotic leakage is one of them

BILIOPANCREATIC DIVERSION WITHOUT OR WITH DUODENAL SWITCH

- Biliopancreatic diversión (BPD) begins with a sleeve gastrectomy, in which 80% of the stomach is removed, leaving a smaller tube-shaped stomach. The end portion of the intestine is then connected to a stoma in the stomach wall, completely bypassing the upper part of the small intestines.

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BILIOPANCREATIC DIVERSION WITHOUT OR WITH DUODENAL SWITCH

- In BPD with duodenal switch (BPD/DS), the gastrectomy is performed so that the pyloric valve that releases food to the small intestine is preserved, along with a limited portion of the duodenum. In this case, the end portion of the intestine is connected to the duodenum near the stomach.

BILIOPANCREATIC DIVERSION WITHOUT OR WITH DUODENAL SWITCH

- In both BPD and BPD/DS, because nutrients are rerouted into the colon, little absorption occurs.
- This type of surgery may be the most effective bariatric treatment for improving diabetes, hyperlipidemia, high cholesterol, high triglycerides, infertility, and sleep apnea if significant weight loss is needed.

BILIOPANCREATIC DIVERSION WITHOUT OR WITH DUODENAL SWITCH

- Disadvantages
  - Higher complication rates and risks of mortality
  - longer hospital stays
  - greater potential for malnutrition
  - Strict adherence to dietary and vitamin supplementation
  - deficiencies of protein and fat soluble vitamins (vitamins A, D, E, and K).
  - Malabsorption of calcium, zinc, selenium, sodium, potassium, chloride, phosphorus, and magnesium is a long-term consequence.

INTRAGASTRIC BALLOON

- The intragastric balloon is a less invasive weight-loss procedure.
- A saline-filled silicone balloon is placed in the stomach using an endoscopy procedure
- The balloon is left in place for about 6 months.
- Side effects: severe nausea, but this usually subsides, and the patient should be prepared for this consequence.

Bariatric surgery

- Before any of these surgeries, the patient should meet with a registered dietitian nutritionist (RDN) to learn what is expected regarding the diet.
- The patient must understand and be willing to follow guidelines.

Bariatric surgery

- a weight loss of 4.5 kg is required before the first appointment with the surgeon can be scheduled.
- An effort should be made to adopt as many of the postsurgery guidelines as possible before surgery.
- A daily food and exercise log must be brought to each nutrition appointment.

Bariatric surgery

- Listed next are the sites of absorption of a number of important nutrients:
  - Stomach: water, ethyl alcohol, copper, iodide, fluoride, molybdenum, intrinsic factor
  - Duodenum: calcium; iron; phosphorus; magnesium; copper; selenium; thiamin; riboflavin; niacin; biotin; folate; vitamins A, D, E, and K

Bariatric surgery

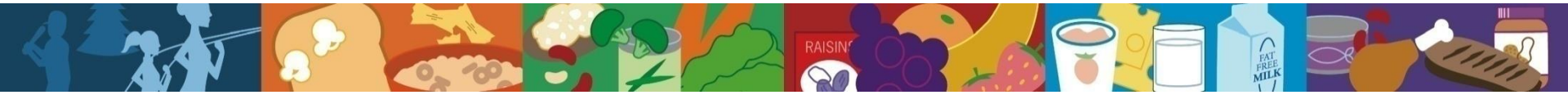
- Listed next are the sites of absorption of a number of important nutrients:
  - Jejunum: thiamin; riboflavin; niacin; pantothenate; biotin; folate; vitamins B6, C, A, D, E, and K; dipeptides; tripeptides; calcium; phosphorus; magnesium; iron; zinc; chromium; manganese; molybdenum; amino acids
  - Ileum: vitamin C; folate; vitamins B12, D, and K; magne sium; bile salts/acids

Bariatric surgery

- Medical practitioners must be aware of preexisting nutritional deficiencies and then treat any nutritional deficiencies that arise or worsen following surgery

Bariatric surgery

- After surgery, it is important for the patient to meet with an RDN periodically for success with achieving weight loss, preventing malnutrition, and performing follow-up procedures.
- Many patients will eventually seek cosmetic surgery, such as abdominoplasty, to remove excess skin after weight loss.



Bariatric surgery

- Deficiencies in protein, iron, vitamin B12, folate, calcium, the fat-soluble vitamins, and other micronutrients are common and become clinically significant if not identified.
- Copper deficiency, for example, has been associated with cardiovascular and neurological changes.
- Selenium levels may be low after bariatric surgery, even in patients who have been taking their prescribed supplements

Bariatric surgery

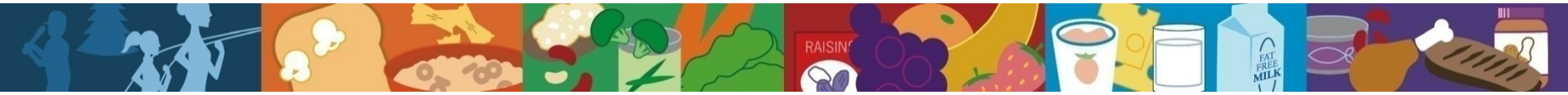
- Monitoring and follow-up with a dietitian is a standard procedure.
- For example, LAGB patients may be seen by the RDN at 2 weeks postoperatively, then monthly for a year, and every 2 to 3 months thereafter.

Bariatric surgery

- Sleeve and bypass patients may be seen by the RDN at 2 weeks, 3 months, and 6 months postoperatively; every 6 months for 2 years; and yearly thereafter.

ASSESSMENT. MONITORING, AND EVALUATION

- **ANTHROPOMETRICS**
  - Height, Weight, BMI (pre- and postsurgery), Postoperative weight, Waist-to-hip ratio, Waist circumference
- **BIOCHEMICAL**
  - A1C, Alb, TTR, ALP, Ca^{++}, Mg^{++}, Choi, CRP, Cu^{++}, Fe^{++}, Ferritin, Folic acid, Gluc, H&H, Interleukin-6, LFTs, Na^{+}, K^{+}, PT, partial thromboplastin time, Thiamin, Trig, Vitamins A, D, E, and K, Vitamin B12



ASSESSMENT. MONITORING, AND EVALUATION

- **CLINICAL/HISTORY**
  - BP, Endoscopy, History of weight-loss attempts, NFPE, Sleep apnea, Weight history

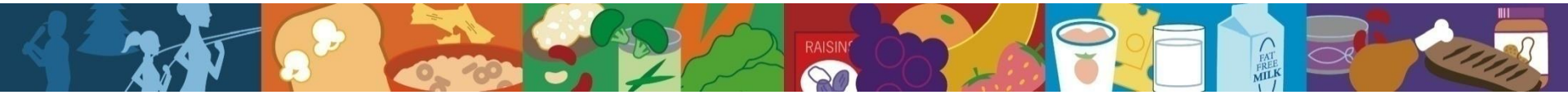
Box 14.7. Tips for Diet Progression After Gastric Bypass

Diet order	Timeframe	Beverage and food choices
Clear liquids (A cup at a time)	Post-op days 1 and 2	Sip at least 48 to 64 oz of liquid (especially water) each day. Clear liquid protein supplements can be used to support protein needs. Water, unsweetened drinks, sugar-free gelatin or popsicles, and clear broths. Diluted (pulp-free) juices. Decaffeinated tea. No carbonated beverages. No straws.

Full liquids (gradually increase to about % cup at a time)	Post-op day 2; lasting for 10 to 14 days	Sip at least 48 to 64 oz of liquid (especially water) each day. Take a prescribed multivitamin every day. Preceding items plus: Full liquids that supply protein and are low in added sugar, including nonfat acidophilus milk, plain soymilk, sugar-free nutritional drinks, and low-fat cream soups made with skim milk for protein. May also add cream of wheat or rice cereal, sugar-free yogurt or pudding, unsweetened applesauce or strained infant fruits, and sugar-free powdered drinks or iced tea.

Semi-solid/pureed (gradually increase to about 1 cup at a time)	Lasting for 7 to 10 days	Sip at least 48 to 64 oz of liquid (especially water) each day. Take a prescribed multivitamin every day. Five to six small meals per day, including protein supplements. Preceding items plus: Low-fat cottage cheese, eggs, tofu, baby-food chicken or turkey for protein in this stage. May also add hummus, regular unfavored oatmeal, baby food or toddler fruits and vegetables, blended fruit smoothies, and chicken or vegetable broth.

Soft/regular (small meals and snacks with no more than 1 cup at a time; 2 oz total of meat)	Soft foods 3-4 weeks after surgery; transition to regular foods 4 to 6 weeks after surgery	Sip at least 48 to 64 oz of liquid (especially water) each day. Take a prescribed multivitamin every day, including protein supplements. Preceding items plus: Soft foods that can be mashed with a fork, including soft fruits and vegetables without skins and peels. Assess tolerance to different textures, such as rice and pasta. Avoid concentrated sweets and sugar (>10 g of sugar per serving). For protein, use lean chicken or deboned fish and most tender meats. Allow 30 to 45 minutes for each meal. Take small bites, and chew food until fairly liquefied before swallowing.

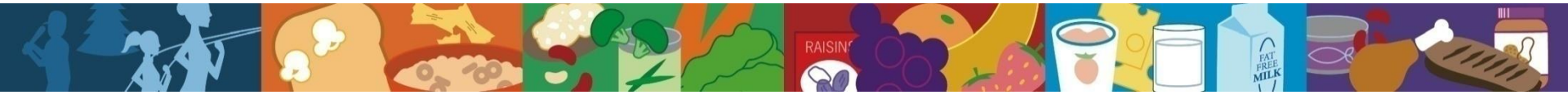


INTERVENTION OBJECTIVES: Preoperative

- Nutritional deficiencies are common in patients who are obese; provide limitation—mineral supplementation before surgery.
- Provide adequate glycogen stores and vitamins C and K for the surgical procedure.
- Consider enteral immunopurified.

INTERVENTION OBJECTIVES: Preoperative

- Ensure good glucose control or at least stable glucose levels.
- Encourage participation in a support group.



INTERVENTION OBJECTIVES: Postoperative

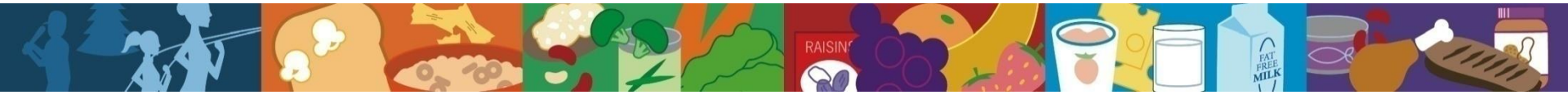
- Promote wound healing and restoration of depleted glycogen in the liver.
- Pair healthy food choices with regular exercise to achieve the desired long-term weight loss. Weight loss averages 4.5kg per month and stabilizes between 18 and 24 months after surgery.

INTERVENTION OBJECTIVES: Postoperative

- Prevent complications, including alkaline reflux gastritis, esophagitis, perforation, gastric dilation, stomal obstruction, peptic ulcer, staple-line disruption, and excessive vomiting. Complications of the surgery are related to the stapling, the origin of the surgery, or the implantable device.

INTERVENTION OBJECTIVES: Postoperative

- Monitor the patient for rare conditions, such as rhabdomyolysis, nesidioblastosis, bowel obstruction, and renal failure.
- At 4 to 6 weeks postoperatively, patients often report that foods taste sweet and will modify their intakes accordingly. Aversions to meat may occur.



INTERVENTION OBJECTIVES: Postoperative

- Manage pica (intake of nonfood substances), which may be found in conjunction with iron-deficiency anemia.
- Have the patient eat and sip liquids slowly to prevent vomiting. Also advise the patient to chew meat and toast in small bites.

INTERVENTION OBJECTIVES: Postoperative

- Prevent neurologic, hematological, and cardiovascular side effects from deficiencies of thiamin, vitamin B12, and other nutrients that may be inadequate.
- Monitor the patient for long-term morbidity and mortality. Fracture risk is high in patients who have undergone bariatric surgery because of altered metabolism of bone-supporting nutrients.

FOOD AND NUTRITION: Preoperative

- Use a balanced diet with adequate energy, protein, vitamins, and minerals. Enteral immunonutrition may be useful.
- Follow hospital protocol: Some surgeons require a preoperative diet of clear liquids for 2 weeks to shrink the liver before surgery.
- The diet should regress from liquids to nothing by mouth 8 hours before surgery.

FOOD AND NUTRITION: Postoperative

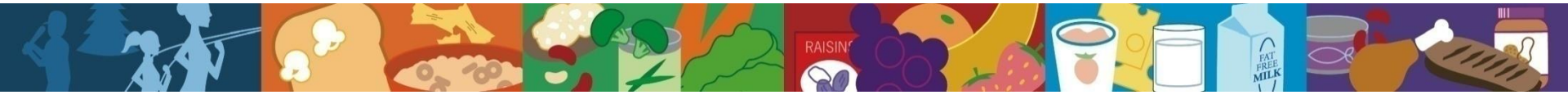
- A gradual progression after surgery is dependent on type of surgery and patient tolerance
- Offer enteral feeding with a high protein content to promote healing. Provide at least 1,000 kcal/d with 1.5 to 2.0 g of protein per kilogram of body weight.

FOOD AND NUTRITION: Postoperative

- Add semisolid or pureed foods in small amounts. Initial gastric capacity is 30 to 60 mL; progression is up to 250 mL over several weeks or months. Three meals and two snacks per dayare better tolerated than three larger meals.

FOOD AND NUTRITION: Postoperative

- Include 60 to 80 g of protein per day. High-protein, low-fat foods such as milk, eggs, yogurt, boneless fish, and skinless poultry are important for maintaining adequate lean body mass during weight loss.
- Carbohydrates should comprise less than 30 g total per meal, but reach a minimum of 130 g per day.



FOOD AND NUTRITION: Postoperative

- Recommend that the patient chew slowly and consume liq uids 30 minutes before or after meals. Patients are likely to vomit if they eat too rapidly, drink fluids right after eating, or overeat.
- Emphasize that the patient should abstain from carbonation and avoid use of straws.

FOOD AND NUTRITION: Postoperative

- Explain dumping syndrome (rapid gastric emptying), in which food, especially sugar, moves too quickly from the stomach to the intestines. Severe diarrhea, nausea or vomiting, lightheadedness, flushing or sweating, abdominal cramping, and pain may occur.

FOOD AND NUTRITION: Postoperative

- If dumping syndrome occurs, advise the patient to avoid alcoholic beverages; soft drinks; and high-fat foods such as fried foods or pastries, cookies, cake, and candies. Have the patient use complex carbohydrates and lie down after meals to reduce symptoms.

FOOD AND NUTRITION: Postoperative

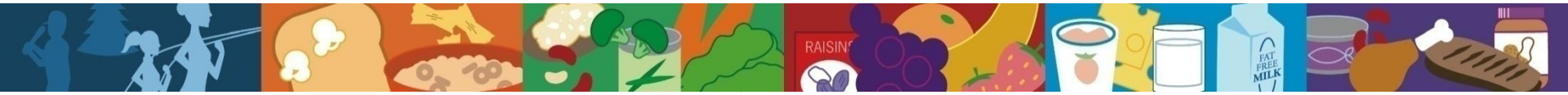
- Ensure adequate fluid intake to prevent dehydration. Each day, at least 40 mL of noncaffeinated, noncaloric fluids, especially water, should be consumed per kilogram of body weight. On average, this should amount to 1.5 L of fluid per day.

FOOD AND NUTRITION: Postoperative

- Advise the patient to use a daily liquid multivitamin-mineral supplement and to receive a monthly vitamin B12 injection.

FOOD AND NUTRITION: Postoperative

- The patient should progress to a chewable supplement that meets 100% of basic daily requirements. Taking a multivitamin with minerals one to two times daily along with additional calcium, vitamin D, iron, and vitamin B-complex is often standard protocol



FOOD AND NUTRITION: Postoperative

- Plant sources of fats and unsaturated fatty acids from fish should dominate.
- Avoid obstructive foods, such as popcorn, celery, nuts, seeds, and citrus fruit membranes.
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FOOD AND NUTRITION: Postoperative

- For critical care nutrition support, consider hypocaloric feedings of 50% to 70% of estimated energy requirements (<14kcal per kilogram of actual body weight) with high protein, based on 1.2 g of protein per kilogram of actual weight or 2 to 2.5 g of protein per kilogram of ideal body weight. Additional protein supplementation may be necessary to meet this goal.