

# Nutrition Guideline

## Bariatric Surgery for Adults

*For Professional Reference Only*

Applicable to: Nurses, Physicians and Other Health Professionals

### Recommendations

- Bariatric surgery may be appropriate for well-informed and motivated adults with a BMI  $\geq 35$  kg/m<sup>2</sup> with at least one obesity-related co-morbidity, or BMI  $\geq 40$  kg/m<sup>2</sup> with or without obesity-related co-morbidities and acceptable operative risks.
- Surgical intervention requires a specialized interdisciplinary team (surgical, medical, behavioural, and nutritional) which, in conjunction with the client's primary care providers, assesses, treats, monitors and evaluates the individual both before and after bariatric surgery.
- Nutrition assessment by a Registered Dietitian is recommended prior to bariatric surgery as part of a comprehensive obesity treatment plan.
- The most important outcomes of bariatric surgery include improvement or resolution of co-morbid conditions, reduction of chronic disease risk, and improved quality of life.
- Average weight outcomes for bariatric surgery are 20 to 30% loss of initial weight or a loss of 50 to 60% of excess weight. Weight regain is normal and expected, occurring most often in years 2 to 6 after surgery.
  - The weight outcomes after bariatric surgery are not to achieve a "normal" weight based on BMI or height/weight reference tables.
  - Predicting specific weight outcomes for an individual is difficult.
- To help clients achieve and maintain improvements to health and weight after bariatric surgery, health care providers can develop a long-term individualized treatment plan to address each client's health and specific barriers, and provide education and monitoring.
- Nutrition assessment and monitoring by a Registered Dietitian is recommended after bariatric surgery. Long term vitamin and mineral supplementation and nutrition monitoring are required after bariatric surgery.
- Women should discuss contraception and timing of bariatric surgery and pregnancy with their physician. Women considering bariatric surgery should take precautions against becoming pregnant for at least 12 months after their surgery.

### Health Benefits

- Reduction in all-cause mortality by 40% primarily due to improvement in diabetes, cancer and cardiovascular disease.<sup>1,2,3,4,5</sup>
- Improvements in obesity-related co-morbidities:<sup>4,6,7,8,9</sup>
  - Diabetes:<sup>10</sup> resolved or improved in 86% of clients<sup>7</sup>
  - Metabolic syndrome<sup>11</sup>
  - Cardiovascular disease:<sup>5,7</sup> 33% reduced first time cardiac events (fatal or non fatal)
  - Hyperlipidemia: improvements in 70% of clients<sup>7</sup>
  - Hypertension: resolved 61%, resolved or improved in 78.5% of clients<sup>7</sup>
  - Respiratory disorders such as sleep apnea (resolved in 85.7%), blood oxygenation and pulmonary hypertension<sup>7</sup>
  - Gastroesophageal reflux disease<sup>12</sup>
- Improved mobility
- Improved access to orthopedic surgery by reducing weight to meet operative criteria<sup>13</sup>
- Improved fertility and pregnancy outcomes<sup>14</sup>
- Improved health-related quality of life<sup>7,15</sup>
- Improved and sustained weight loss compare to all other treatments<sup>5,9,16</sup>

## Key Questions

### What is bariatric surgery?

The term “bariatric” refers to the field of medicine that addresses the causes, prevention and treatment of obesity. Bariatric surgery refers to a number of different surgical interventions designed as a tool to assist in obesity management. Each procedure assists with obesity management by restricting food intake through creation of a small pouch in the stomach. Some procedures may also produce malabsorption by altering the gastrointestinal tract.

### Why use surgery to treat obesity?<sup>17</sup>

Obesity is a complex chronic disease that has many factors. The common belief that people can decide to simply “eat less and move more” is incorrect and not supported by the literature.<sup>18</sup> Bariatric surgery is the most effective treatment option available for obesity.<sup>6,14,19</sup> It achieves greater weight outcomes and improvement in co-morbid conditions than all other treatment options and is sustainable in most clients.<sup>14,20</sup>

Although bariatric surgery is an effective treatment, it is not appropriate for all clients with obesity. It should be considered an **addition to other obesity treatment options, not a replacement**. Treatment for obesity, including bariatric surgery, is more successful when a team of multidisciplinary health care providers, in conjunction with primary health care providers, assess, treat, monitor and evaluate individuals both before and after surgery.<sup>8,14,18,19</sup>

### What are the relative indications for bariatric surgery?

Clinical guidelines developed by National Institutes of Health provide specific recommendations for bariatric surgery.<sup>14,18,19,21</sup> Although these guidelines were developed in 1991, they have remained important guiding principles. Though many adults may meet the criteria for assessment for bariatric surgery, the following factors also need to be taken into account when considering bariatric surgery:

**Weight and Health:** Bariatric surgery may be appropriate for clients with a BMI  $\geq 35$  kg/m<sup>2</sup> with at least one obesity-related co-morbidity, or BMI  $\geq 40$  kg/m<sup>2</sup>. Obesity-related co-morbidities are conditions that tend to worsen as weight increases and generally improve as weight decreases. Examples include coronary artery disease, hypertension, stroke, cancer, type 2 diabetes mellitus, gall bladder disease, osteoarthritis, obstructive sleep apnea, obesity hypoventilation syndrome, non-alcoholic fatty liver disease/steatohepatitis, dyslipidemia, pseudotumor cerebri, gastroesophageal reflux disease, asthma, venous stasis disease, severe urinary incontinence or considerably impaired quality of life.<sup>8</sup>

**Intervention History:** It must be documented that conventional obesity management interventions have been tried. Documentation should include method, time frame, impact on weight and health, and both positive components and perceived negatives of the treatment. Intensive lifestyle therapy (nutrition, activity, behaviour modification) should be implemented before surgery. Medical necessity for bariatric surgery should be documented.<sup>8</sup>

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**Accountability and Responsibility:** The individual needs to demonstrate adherence to recommendations by attending appointments, practicing self-monitoring with record keeping, making time for healthy eating and activity, taking medication and completing blood work.

**Comprehension and Understanding:** The individual must have an understanding of the benefits and limitations of a surgical procedure to assist with management of their obesity. They must be able to understand directions or instructions and follow through with goals of care. There should be no significant barriers that would prevent the person from giving informed consent.

**Acceptable Level of Risk:** All clients with obesity are at increased surgical risk. The risks of surgical intervention must not be excessive and must be lower than the risks of not providing the treatment.<sup>8,18</sup> Co-morbid conditions and advancing age (>55 years) increase the level of risk.<sup>22,23,24</sup>

### What are the exclusion criteria for bariatric surgery?<sup>8,14,18,19</sup>

Bariatric surgery is not appropriate for all people with obesity. The exclusion criteria listed below may or may not be absolute. If the concern can be effectively addressed and treated, the client could be reassessed. Assessment by a bariatric surgeon and interdisciplinary team is required.

- BMI less than 35 kg/m<sup>2</sup>
- Age under 18 years or older than 65 years
- Lifestyle and/or medical treatments for obesity have not been trialed or optimized
- Medical condition that makes surgery too risky (i.e. poor cardiac or respiratory status, thromboembolic condition, liver disease, severe esophageal dysmotility)
- Genetic conditions such as Prader-Willi syndrome
- Active cancer diagnosis, work-up or treatment
- Lack of safe access to abdominal cavity or gastrointestinal tract. This may be due to small bowel disease (i.e. Chrons or ulcerative colitis), extensive abdominal surgery (i.e. abdominal hernia repairs with mesh, multiple adhesions, fundoplication, gastrectomy), severe hiatal hernia, or abnormal anatomy.
- Clinically significant or unstable mental health concerns, which may include personality disorders, eating disorders, alcohol or substance abuse, untreated depression, psychosis, physical or sexual abuse, suicide attempts or intent and psychiatric hospitalizations
- Smoking status. Smoking and obesity increase cardiovascular risk. All smokers, regardless of their weight status are recommended to quit smoking as a major goal of risk-factor management.<sup>21</sup> All clients should have quit smoking for least 8 weeks before surgery and should be encouraged to remain a non-smoker and participate in a smoking cessation program.<sup>8</sup>
- Clearly unrealistic post-surgical target weight (unable to change with education)
- Clearly unrealistic expectations of a surgical treatment (unable to change with education)
- Significant history of poor adherence with lifestyle, medical and/or mental health intervention
- Pregnancy and lactation or plan for pregnancy within 2 years of potential surgical treatment<sup>8</sup>

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### Why should a woman wait to become pregnant after bariatric surgery?

Pregnancy after bariatric surgery is an evolving field with limited evidence. With appropriate care, pregnancy after bariatric surgery appears to be safe and produces good maternal and fetal outcomes in those populations studied, however evidence is limited. Long-term outcomes for both mother and offspring are still needed. Published literature to date does not include women with sleeve gastrectomy.

The evidence to date suggests for women to delay pregnancy after bariatric surgery to:

- Achieve optimal weight outcomes for the woman after bariatric surgery
- Minimize risk of protein/energy malnutrition to mother and fetus
- Minimize risk of vitamin and mineral deficiencies to mother and fetus

It is recommended that women considering bariatric surgery take precautions against becoming pregnant for at least 12 months after their surgery,<sup>4,25</sup> though some literature suggests up to 2 years.<sup>7</sup> Other literature suggests achieving specific outcome targets instead of a specific time interval,<sup>26</sup> such as avoiding pregnancy until weight loss stabilizes and nutritional deficiencies are treated.<sup>27,28,29,30,31</sup> Malnutrition and vitamin/mineral deficiencies can occur at any time after bariatric surgery, impacting maternal and fetal outcomes. Regular monitoring and evaluation is important.

Another challenging clinical question is whether it is better to have bariatric surgery first then pregnancy, or delay bariatric surgery until after childbearing. Obesity increases both maternal and fetal risks and is associated with infertility. Bariatric surgery also has risks, but is linked to improvement of most obstetrical outcomes and positive long-term impact on the health of offspring.<sup>32</sup>

Women should discuss contraception and the timing of bariatric surgery and pregnancy with their physician.

*Refer to Guideline: Pregnancy*

### What are the different types of bariatric surgery?<sup>4,8,9</sup>

There are three main types of bariatric surgical procedures based upon function: restrictive; combined (restrictive and malabsorptive) and primarily malabsorptive. Details of the procedures are well documented in the literature. The most common bariatric procedures are the gastric band, sleeve gastrectomy and gastric bypass. All three surgeries are currently performed in Alberta.

The majority of bariatric surgical procedures are performed laparoscopically with minimally invasive surgical techniques. Compared to open procedures, laparoscopic surgery has decreased complication rates (e.g. wound infections, hernia, thromboembolism), shortened recovery time and decreased length of stay in hospital. Clients report improved quality of life and are able to return to activities of daily life and work earlier than open procedures.<sup>8,9,14,33,34</sup> All procedures are considered permanent: they are not reversed when a person has lost weight and has become stable.

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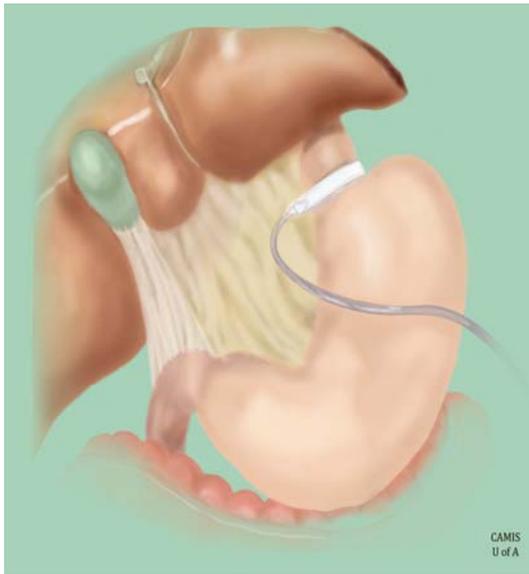


Figure 1: Gastric Band

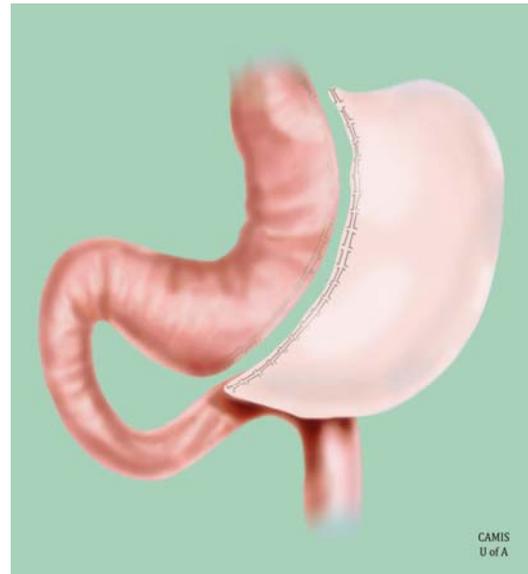


Figure 2: Sleeve Gastrectomy

Source of illustrations: CAMIS, 2009; used with permission

### Restrictive Procedures

**Laparoscopic Adjustable Gastric Band (LAGB)** (see Figure 1)<sup>8</sup> employs laparoscopic insertion of a silicone gastric band at the upper end of the stomach creating a small pouch (approximately 30 mL volume or the size of a thumb) and a narrowed opening or stoma (up to 10 mm or the size of a dime) into the main stomach. The remainder of the stomach remains intact with no alterations to the intestine, leaving digestion and absorption unchanged. This is a restrictive procedure; the first effect is to produce fullness and satiety with a smaller portion of solid food (i.e. approximately 1 cup/250 mL). The second effect is to delay emptying of food from the pouch into the stomach through the narrow opening/stoma, prolonging satiety. The band is filled using a specialized needle with a saline solution through a port secured to the abdominal wall. The adjustment is customized to each individual to create appropriate narrowing of the stoma to produce sufficient early satiety and sustain moderate weight reduction.

**Sleeve Gastrectomy (SG)**(see Figure 2):<sup>8,35,36,37,38,39,40</sup> Rather than a pouch, this procedure creates a “sleeve” in the stomach, extending from the esophagus to the duodenum. The size of the gastric sleeve is approximately 60 to 120 mL. The gastric remnant, approximately 80% of the stomach, is removed. Production of grehlin, a hormone involved in appetite, is reduced, resulting in decreased hunger and improved satiety. No alterations are made to the intestine, leaving absorption of food unchanged. However, reduction of stomach acid may impact digestion and absorption of iron, calcium and vitamin B<sub>12</sub>.

The main purpose of the sleeve gastrectomy was to serve as a “primary” or “staged” procedure for high risk clients, producing weight loss (37% excess weight lost (EWL) at 6 months, 50% EWL at 1 year)<sup>41</sup> and decreasing operative risk for the second surgery (usually a gastric bypass). However, many clients may achieve good outcomes and not require the second procedure. The procedure is not reversible. To date, the SG is an investigational procedure with limited data; more research is required to determine safety and long-term outcomes.

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Figure 3: Vertical Banded Gastroplasty



Figure 4: Roux-En-Y Gastric Bypass

*Source of illustrations: CAMIS, 2009; used with permission*

Vertical Banded Gastroplasty (VBG)<sup>42</sup> (see Figure 3) is no longer routinely performed by bariatric surgeons and is considered obsolete. However, clients may present with this procedure as part of their medical history. This procedure involves stapling the stomach, front to the back, below the gastroesophageal junction and 1 cm from the lesser curvature. The surgical stapling device cuts out a hole. A vertical staple line is then made from the opening to the left side of the gastroesophageal junction, and the outlet stoma is restricted with a 1 cm diameter polypropylene band. The band mechanically restricts food intake, creating an early sense of satiety. The VBG had a higher than expected complication rate, particularly stricture and formation of gastro-gastric fistulae between the pouch and remnant stomach, and has a high re-operation rate.

### Combined Procedures

Roux-En-Y Gastric Bypass (RYGB) (see Figure 4) procedure creates a small gastric pouch (30 mL) by stapling and dividing the stomach. Next, the small intestine is dissected at about 100 to 150 cm from the stomach. The distal end is attached to the pouch and the proximal end is re-attached to the small intestine. All intakes completely bypass the stomach and duodenum, emptying directly into the jejunum. Digestion and absorption of iron, calcium, folic acid and vitamin B<sub>12</sub> are impacted.

## Malabsorptive Procedures

Malabsorptive procedures (jejunioleal bypass or biliopancreatic diversion) decrease absorption of nutrients by decreasing the length of small intestine that is exposed to food. Malabsorptive procedures produce significant weight loss but also have the highest complication rates, including significant malnutrition and vitamin and mineral deficiencies. Procedures such as the jejunioleal bypass is no longer performed due to significantly high complication rates.<sup>8,9,43</sup> All clients with malabsorptive procedures should be considered at high risk for malnutrition. Referral to a Registered Dietitian is recommended.

<b>What are the possible complications that may occur after bariatric surgery?</b>
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Operative mortality rates for bariatric surgery range from as low as 0.1% to as high as 2%.<sup>4,7,24</sup> Lower morbidity and mortality are associated with surgeon experience, higher surgical volume (more than 100 cases per year), surgery in a tertiary care facility, gender of client (female), age of client (under 55 years), and good respiratory status.<sup>24</sup>

The early (within 60 days) and late (more than 60 days) post-surgical complications are well documented and reviewed in the literature.<sup>4,7,24</sup> This section provides a brief summary of the post-surgical complications that may present to primary health care providers. Referral to a physician, bariatric surgeon, bariatric team or Registered Dietitian may be warranted.

### All procedures:

- **Nausea, emesis or vomiting** can be improved for most clients with education regarding food selection and eating behaviour. Clients with protracted vomiting should be assessed by a physician or surgeon for strictures, obstructions, a LAGB that is too tight, or differential diagnosis (e.g. pregnancy). Clients with persistent or protracted vomiting are at risk for thiamine deficiency and should be supplemented if neurological symptoms present.<sup>8,25</sup>
- **Excess or loose skin** is a common, unwanted side effect of significant weight loss. This excess skin can produce significant health effects including difficulty with self care, increased risk for infections, back pain and barriers to movement and mobility. Referral to physician or occupational/physical therapist for skin care, adaptive aids, abdominal binders or other treatment is recommended. Assessment by a bariatric or plastic surgeon is recommended.
- **Small bowel obstruction** may present as abdominal bloating, cramping, pain and nausea to severe pain and emesis.<sup>44</sup> It may be due to adhesions, internal hernias or severe constipation. Increased dietary fibre is not recommended at this time. Assessment by a physician is recommended.
- **Ulcers of the stomach or anastomosis (marginal ulcers)** may present as upper epigastric pain and/or burning that can radiate to the back, with symptoms of nausea, vomiting and food intolerances. Iron deficiency anemia is commonly associated with chronic ulcers.<sup>45</sup> Use of tobacco, aspirin and nonsteroidal anti-inflammatory medications should be avoided after gastric operations.<sup>8,46</sup>
- **Cholestasis and cholelithiasis (gallstones)** is more common in clients with significant (more than 25% initial weight) or rapid weight loss after bariatric surgery. Medication may be required.<sup>47</sup>

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### Restrictive procedures:<sup>48</sup>

- Erosion or slippage of the band may occur. Clients who had a LAGB or VBG may present with symptoms of dysphagia, nausea, vomiting, inability to tolerate solid food, abdominal pain or discomfort, or possible excessive weight loss.<sup>48</sup> Referral to a bariatric surgeon is recommended as repositioning, replacement or removal of the band may be required.
- Leakages from port, tubing or reservoir (LAGB):<sup>45</sup> Clients report feeling appropriate fullness or satiety initially after an adjustment (i.e. saline fill of the port), but complete loss of this sensation and significant increase in volume of solid food tolerated occurs within a few days. Weight re-gain or lack of weight loss may occur. Referral to a bariatric surgeon is recommended. A Registered Dietitian can assist the client with food selection and portion control to assist with satiety and weight management.

### Combined Procedures:

- Anastomotic stricture may occur during healing as scar tissue develops. Strictures may be suspected if a recent surgical client (e.g. RYGB, SG) had previously been tolerating oral intake, but now reports consistent and progressive nausea and vomiting with solid foods, and is only able to tolerate small amounts of liquids at a time. Clients with possible strictures require referral to a bariatric surgeon. These clients also need a referral to a Registered Dietitian, who will help the client meet nutrition requirements and manage symptoms.
- Gastro-gastric fistula may develop due to failure or incomplete staple partition of the pouch.<sup>9</sup> Clients may present with tolerance of a high volume of solid food, lack of restriction, lack of satiety, tolerance to textures commonly difficult after bariatric procedures (sticky, doughy, stringy, tough) and either weight re-gain or poor weight loss outcome. Referral to a bariatric surgeon is recommended for assessment and possible surgical repair.
- Although rare, acute gastric dilation may occur either spontaneously or due to small bowel obstruction, preventing emptying of the stomach remnant for RYGB. It is recommended clients go to the emergency department for assessment.

**My client is pregnant after bariatric surgery. What should I do if she has nausea and vomiting?**

Nausea and vomiting are non-specific symptoms that are common among both pregnant women and after bariatric surgery. It is challenging to differentiate if the contributing factor is the pregnancy, bariatric surgery or both. Surgical complications such as gastric band slippage, hernias (intestinal or internal) or bowel obstructions can present as epigastric pain or discomfort, nausea and/or vomiting.<sup>4,25,26</sup>

If your client who has become pregnant after bariatric surgery experiences nausea and vomiting, she should be assessed by her physician. A bariatric surgeon should be consulted early in the course of evaluation of abdominal pain, recurrent nausea and/or vomiting to determine if it is a surgical complication.<sup>27</sup>

*Refer to Guideline: Pregnancy*

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### What is dumping syndrome?

Dumping syndrome can occur after bariatric surgery for combined (RYGB) or malabsorptive procedures because food now enters the small intestine directly, bypassing the stomach. It does not occur for restrictive procedures.

Early symptoms (within 30 minutes after eating) occur when food and fluid pass into the small intestine too fast. These may include nausea, vomiting, stomach pain or cramping, diarrhea, feelings of fullness or bloating or increased heart rate. Late symptoms (1 to 3 hours after eating) occur when there are changes in the amounts of insulin and sugar in the blood (reactive hypoglycemia). These may also include flushing or sweating, intense need to lie down, feeling weak or dizzy, feeling nervous or shaky or a drop in blood pressure.

Nutrition recommendations to improve symptoms of dumping syndrome include:

- Eat 4 to 5 times per day
- Eat smaller meals
- Limit foods high in sugar
- Choose foods with fibre
- Do not drink liquids at least 30 minutes before or after eating solid foods

Referral to a Registered Dietitian is recommended. For some clients, symptoms may be severe and require assessment by a physician or bariatric surgeon.

### Is another surgery ever needed?

Although most complications can be managed either medically or with lifestyle interventions, some clients may require a surgical intervention. The main reasons for a surgical intervention after bariatric surgery include:<sup>8,40</sup>

- technical complications from the procedure (e.g. gastric band leak, gastric band erosion, gastrogastic fistula due to staple line failure),
- severe malnutrition (e.g. due to malabsorption, excessive restriction or eating difficulties compromising oral intake, excessive weight loss),
- poor clinical outcomes requiring a conversion of a restrictive procedure to another bariatric procedure

A surgical intervention may either serve as a “revision” to repair a defect or a “conversion” of one bariatric procedure to another. Within the literature, the revision rate for bariatric surgery varies from as low as 2.2% to as high as 25%.<sup>16,40,49</sup> The revision rate is higher for restrictive procedures, such as VBG (56%) versus RYGB (12%).<sup>50,51</sup> The majority of revisional surgeries are open procedures, not laparoscopic. Revisional procedures are technically more difficult and are associated with higher morbidity and mortality.<sup>40</sup>

Weight loss after revision/repair of a restrictive procedure only (e.g. repair of a gastric band) is typically not significant.<sup>52</sup> Weight outcomes after conversion of a restrictive procedure (e.g. VBG) to a gastric bypass are similar to those seen in clients who had a gastric bypass as their first and only procedure.<sup>51,52,53</sup>

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After significant weight loss, many clients may experience excess skin. A surgical intervention, such as a panniculectomy, is often required to remove the excess skin. Body contouring procedures may also be required. Assessment by a bariatric or plastic surgeon is recommended.

### What are the average weight outcomes after bariatric surgery?<sup>7,8,14,30</sup>

Weight outcomes for bariatric procedures are described as the percentage of initial weight lost or the percentage of excess weight lost (% EWL). Excess weight is the total amount of weight above a reference standard for “ideal” weight (BMI of 24.9). On average, bariatric surgery produces a weight loss of approximately 20-30% initial weight or about 50-60% EWL. Five years after surgery a weight loss of 50% EWL or 20% loss of initial weight is considered a successful outcome.

Let’s try an example: Your client is 163 cm tall, weighs 136 kg and the reference BMI=24.9 kg/m<sup>2</sup> is 66kg.

- Percentage of initial weight lost: A loss of 20-30% of initial weight would be approximately 27-41kg, to reach 95-109 kg.
- Percentage of excess weight lost (% EWL): To determine the excess weight, subtract the initial weight from the BMI 24.9 (136kg – 66kg) to get 70kg of excess weight. The weight outcome of 50-60% EWL is approximately 35-42kg to reach 94-102kg.

Rate of weight change: The most rapid weight loss often occurs in the first 3 months after surgery. In the first 6 months after surgery, the initial rate of weight loss is faster for RYGB compared to LAGB/VBG. Weight loss usually continues for 12 to 18 months for RYGB and up to 24 months for LAGB. Most clients will experience weight stability at 18 to 24 months and by 36 months experience some weight regain.<sup>9</sup>

Five years or more after surgery weight loss outcomes (% EWL) the various procedures may not be significantly different from each other. One systematic review reported 61% EWL at 10 years for all bariatric procedures.<sup>54</sup> The Swedish Obesity study group reported weight outcomes (as loss of initial weight) of 23% at 2 years, 17% at 10 years, 16% at 15 years and 18% at 20 years after bariatric surgery.<sup>5</sup> Another study showed 27.7% loss of initial weight six years after gastric bypass.<sup>55</sup>

Although weight outcomes are important, the most important outcomes after bariatric surgery are resolution of co-morbid conditions and improvement in quality of life.

### How should healthcare providers discuss post-bariatric surgery weight outcomes with clients?

Providers should reinforce that although weight outcomes are important, the most important outcomes after bariatric surgery are resolution of co-morbid conditions and improvement in quality of life.

Average weight outcomes after bariatric surgery have been published. Despite this, it is not possible to exactly predict the weight outcomes for an individual. Outcomes depend on many variables affecting weight regulation. Each person and situation is different.

The weight outcomes after bariatric surgery are not to achieve a “normal” weight based on height and weight reference tables or BMI ranges. These tools are designed to determine health risk, not weight loss

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targets. Weight loss to a “normal” weight represents an excessive loss to  $\geq 100\%$  EWL and is not recommended.

Healthcare providers should discuss the average post-surgical weight changes described in the previous section, *What are the average weight outcomes after bariatric surgery?*. On average, bariatric surgery produces a weight loss of approximately 20-30% initial weight or about 50-60% EWL. Five years after surgery a weight loss of 50% EWL or 20% loss of initial weight is considered a successful outcome.

### What if weight loss is less or more than expected?

Inadequate weight loss ( $< 30\%$  EWL)<sup>56</sup> may be an indication of surgical or technical failure (e.g. loss of integrity of gastric pouch), lack of proper adjustment to the LAGB, maladaptive eating behaviours or psychological complications (e.g. depression, anxiety). Excessive weight loss ( $> 80\%$  EWL) may indicate protein/calorie malnutrition, excessive restriction of intake, excessive exercise or unintentional weight loss due to other reasons (i.e. obstructions, cancer). Investigations and referral to the appropriate health care provider or bariatric team are recommended.<sup>8</sup>

### Is it possible to re-gain weight lost after bariatric surgery?<sup>5,55</sup>

No treatments are available to cure obesity, it is a chronic disease that needs to be monitored and managed over time. Weight re-gain is part of the typical pattern of weight change after bariatric surgery: first there is a weight loss phase, followed by a weight regain phase, and then weight stability.

Weight regain after bariatric surgery most commonly occurs in 2 to 6 years after the procedure, with about one-third of the initial weight lost regained within 5 years. In spite of this, bariatric surgery remains the most effective treatment producing better and sustained weight outcomes than any other treatment.

### What factors contribute to weight re-gain?<sup>57,58</sup>

There are several factors that may contribute to weight re-gain. It is important to continue with nutrition, activity, behaviour modification and medical interventions and provide clients with ongoing monitoring and support.

#### Behaviour and Self Monitoring

- Decrease or discontinuation of self monitoring
- Changes to physical or mental health impacting lifestyle behaviours (e.g. depression)

#### Nutrition

- Increased caloric intake
- Selection of calorie-dense foods
- Increased frequency of eating: 6 or more times per day: grazing pattern of intake
- Consumption of caloric beverages above total daily calorie goal
- Consumption of carbonated beverages - may contribute to decreased satiety over time
- Consuming liquids within 30 minutes of a solid meal or snack

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- Rate of eating is too slow (grazing pattern, over 30 minutes for a meal)
- Adaptation to feelings of fullness/satiety over time; able to eat increased portion of food

### Medical or Surgical

- Decreased metabolic rate: due to advancing age, decreased muscle mass, medication, disease, endocrine factors
- Medication side effects
- New diagnosis or worsening of co-morbid condition impacting lifestyle behaviours
- Surgical/Technical problems (e.g. leak of saline from appliance [LAGB], Gastro-gastric fistula [RYGB])

### Activity

- Increase in sedentary behaviour
- Decrease or discontinuation of activity
- Decreased energy expenditure (e.g. injury or illness)

*Refer to Guideline: Adult Weight Management*

**What are the nutrition recommendations after bariatric surgery?<sup>8,33,58</sup>**

All clients should follow a well-balanced, calorie-reduced diet as part of a comprehensive weight management strategy. Multiple factors impact both the quantity and quality of intake after bariatric surgery, and will increase nutrition risk. There are specific diet recommendations for the first few weeks after surgery, including starting with a liquid diet and progressing to solid foods.

**Referral to and monitoring by a Registered Dietitian is required after bariatric surgery.<sup>8,33,59</sup>**

The following are general recommendations for nutrition after bariatric surgery once the client has progressed to solid foods.

- Eat 4 to 5 times per day (3 small meals plus 1 to 2 small snacks, including breakfast).
- Make time for meals and snacks to eat slowly and chew food well.
- Limit intake of solid food to approximately 1 cup (250 mL) at each meal or snack.
- Choose mostly solid food at meals and snacks.
- Avoid textures that are difficult to chew (e.g. sticky, doughy, stringy, tough) as they may cause discomfort and vomiting due to obstruction in the stoma of the pouch.
- Fluids should not be consumed within 30 minutes (before or after) of eating any solid foods.
- Beverages and liquid foods (e.g. soup) should be consumed between meals and snacks.
- Carbonated beverages should be avoided.
- Avoiding higher sugar foods and beverages is recommended to prevent dumping syndrome for clients with alterations to their intestine (e.g. RYGB).
- Take all vitamin and mineral supplements as recommended.

**What is recommended for vitamins and minerals after bariatric surgery?<sup>59</sup>**

Vitamin and mineral supplementation is recommended for all restrictive procedures and required for life for combined or malabsorptive procedures. Blood work is recommended to detect and monitor for vitamin and mineral deficiencies with attention to iron (CBC-diff, ferritin, iron, TIBC and % sat), folic acid (folate), bone

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health (25-OH vitamin D, calcium and PTH) and vitamin B<sub>12</sub>. General recommendations are provided below. Ongoing assessment and monitoring is required to make individual recommendations. Referral to a Registered Dietitian is recommended.

### Restrictive Procedures (LAGB/VBG)

Malnutrition or vitamin/mineral deficiencies are rare with restrictive procedures, but may occur if diet is inadequate due to low calorie intake or client avoidance/intolerance of certain foods (e.g. meats, some fruits and vegetables). General recommendations include:

- One multivitamin and mineral supplement daily (life-stage appropriate)
- Additional calcium and vitamin D supplementation if required.

### Roux-En-Y Gastric Bypass (RYGB)

Incidences of malnutrition and vitamin/mineral deficiencies (iron, calcium, folic acid, vitamin B<sub>12</sub>) are higher due to the malabsorptive component for RYGB. General recommendations include:

- One prenatal vitamin supplement daily (providing extra iron and folic acid within one pill)
- Calcium citrate with vitamin D supplement daily to meet requirements
- Additional iron and vitamin B<sub>12</sub> supplementation if required.

### Sleeve Gastrectomy (SG)

At present, vitamin and mineral recommendations for SG are the same as for RYGB as the impact on vitamins and minerals such as iron, calcium and vitamin B<sub>12</sub> is suspected but uncertain.

### Should women who become pregnant after having bariatric surgery take vitamins?

Deficiencies have been documented with serious health implications for babies born to mothers after bariatric surgery. Deficiencies are more prevalent after malabsorptive procedures and in women who do not take supplements as recommended.<sup>25,60</sup> Due to the increased risk of deficiencies, an evaluation of micronutrient status at the beginning of pregnancy (and prior to conception if possible) for women who have had bariatric surgery should be considered.<sup>31</sup> Nutritional deficiencies are minimal after LAGB and gastric bypass if the mother takes the recommended vitamin/mineral supplementation and is monitored.<sup>61</sup> Vitamin/mineral status of pregnant women after sleeve gastrectomy is not known at this time.

In general, women who are taking an adult multivitamin (i.e. after LAGB) can switch to a prenatal supplement. Some bariatric surgery clients may already be taking a prenatal vitamin (i.e. gastric bypass, sleeve gastrectomy) or additional supplements as part of their nutrition prescription to meet requirements after bariatric surgery. The supplementation regime recommended after bariatric surgery may not be sufficient to meet the additional requirements of pregnancy. A thorough assessment should be conducted and single-format supplements (i.e. iron, folic acid, vitamin D, vitamin B<sub>12</sub>) should be considered in addition to the prenatal multivitamin to meet the needs of the client. Taking more than one prenatal multivitamin is generally not advised.

A Registered Dietitian can carefully assess the intake of vitamin and minerals from all sources to identify if there is a risk of deficiency or if the client is at risk of exceeding the tolerable upper intake levels of certain vitamins and minerals.<sup>62,63,64</sup> Consult with the client's physician about recommendations for vitamin and

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mineral supplementation in pregnancy after bariatric surgery, and with the client's pharmacist for assistance with product selection.

*For more information on vitamin and mineral recommendations during pregnancy please refer to Nutrition Guidelines for Primary Care: Pregnancy.*

### How do you decide what surgery is best?

It is a complex decision to determine if bariatric surgery is appropriate, and if so, which procedure. There are benefits and risks for any surgical procedure that need to be carefully evaluated for each client. Surgical intervention requires a specialized interdisciplinary team which, in conjunction with the client's primary care providers, assesses, treats, monitors and evaluates the individual both before and after surgery.<sup>8,14,21</sup>

The Alberta Health Services Provincial Obesity Program operates five interdisciplinary Adult Bariatric Specialty Clinics across the province. In addition, revisional bariatric surgery services are available.

Referral to the Adult Bariatric Specialty Clinics is required. Please visit the AHS website ([www.albertahealthservices.ca](http://www.albertahealthservices.ca)) for more information regarding these clinics, available services, and referral requirements.

### Are there any handouts on bariatric surgery I can use with my clients?

Refer to approved provincial Alberta Health Services bariatric nutrition handouts to support patient education. For more information, contact [Nutrition.Resources@albertahealthservices.ca](mailto:Nutrition.Resources@albertahealthservices.ca)

### Resources for Healthcare Providers on Obesity and Bariatric Surgery

#### Canadian Association of Bariatric Physicians and Surgeons (CABPS)

[www.cabps.ca](http://www.cabps.ca)

The CABPS represents Canadian specialists interested in the treatment of obesity and severe obesity for the purposes of professional development and coordination and promotion of common goals.

#### Canadian Obesity Network (CON)

[www.obesitynetwork.ca](http://www.obesitynetwork.ca)

The mission of CON-RCO is to reduce the burden of obesity on Canadians by linking obesity researchers with health professionals, policy makers and other stakeholders to foster knowledge translation, capacity building and partnerships.

#### American Society for Metabolic and Bariatric Surgery (ASMBS)

[www.asmb.org](http://www.asmb.org)

An organization of health care professionals with the purpose to advance the art and science of metabolic and bariatric surgery. Provides guidelines, accreditation and educational opportunities for surgeons and integrated health professionals.

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