

# Preoperative Dietary Interventions in Patients with Excess Weight/Obesity

Subjects: Primary Health Care

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Preoperative VLCD and LCD interventions provided for one to three weeks to patients with overweight, obesity, higher amounts of visceral fat, or liver steatosis have potential to reduce operating time and blood loss during non-bariatric elective surgeries within the abdominal cavity, such as laparoscopic cholecystectomy, liver resection, and gastrectomy. Although the benefits were likely in studies that used dietary interventions longer than three weeks in other surgery types, they were less clear due to the lack of comparator groups and common surgical endpoints.

Keywords: surgery ; complications ; obesity ; weight loss

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## 1. Introduction

Obesity has tripled worldwide since 1975, with 31% of adults in Australia classified as obese <sup>[1]</sup>. The increase in obesity and the associated higher volume of visceral fat and liver steatosis is paralleled by the increased number of patients who require elective surgery for conditions that these individuals are at higher risk for, such as gallstones, liver cancer, and colorectal cancer <sup>[2][3]</sup>.

It is widely accepted that the presence of obesity and excess visceral fat is a risk factor for complications arising from a variety of elective surgeries <sup>[4][5][6]</sup>. Cardiac and pulmonary events, excess blood loss, surgical site infection, and lengthier stays in hospital occur more frequently for surgical patients with obesity when compared to those in the healthy weight range <sup>[5][7][8]</sup>. Excess visceral fat and a high liver volume due to liver steatosis are known to complicate the technical aspects of surgery within the abdominal cavity <sup>[9]</sup>. Furthermore, in minimally invasive surgery, increased abdominal wall adiposity increases the length of time for port placement and hinders abdominal wall compliance during the procedure <sup>[6][10]</sup>. These difficulties can hinder operative exposure, which can increase blood-loss volume and operating time, both of which are associated with a higher risk of postoperative complications, which attribute major costs to surgical care <sup>[11]</sup>.

Many institutions have implemented formal or informal Body Mass Index (BMI) cut-off thresholds for particular elective surgery types <sup>[12][13]</sup>, and it is now commonplace for surgeons to ask their patients with obesity to lose weight prior to surgery <sup>[14]</sup>. Despite these requests, there is limited evidence that preoperative weight-loss interventions provide benefit to surgical outcome <sup>[15][16]</sup>. The only surgical specialty that has been extensively investigated to date is bariatric surgery, where Very Low Calorie Diets (VLCDs) are routinely prescribed to patients for two weeks prior to surgery <sup>[10]</sup>. Multiple studies in bariatric surgery have demonstrated that preoperative weight loss in response to VLCD, reduces visceral fat and liver steatosis and volume, thereby reducing operating time and risk of some postoperative complications <sup>[14]</sup>. For other types of elective surgery, it is unclear whether VLCD and/or other types of dietary approaches result in preoperative weight loss and/or liver shrinkage, reduced operating time, and reduced risk of complications. In addition, the type of surgery that may benefit most from risk reduction is presently unknown. Also of concern is the safety of preoperative weight-loss interventions, considering that potential loss of lean body mass may place patients at greater risk of complications <sup>[17][18][19]</sup>.

## 2. Preoperative Dietary Interventions in Patients with Excess Weight/Obesity

It has been established that a 14-day VLCD prior to bariatric surgery can reduce the risk of 30-day postoperative complications <sup>[14][20]</sup>. The same intervention could potentially be utilised prior to elective laparoscopic cholecystectomies, liver resections, and gastrectomy to reduce visceral fat and liver steatosis, leading to reduced blood loss and operating time. Whether it reduces 30-day postoperative complications in the same way as bariatric surgery is still unclear and requires further research. Measuring patients' visceral fat or liver steatosis is not currently part of standard care for

patients awaiting these types of surgery but has the potential to better predict postoperative complications than BMI [21] and may be worth considering to facilitate direction of additional preoperative resources to those patients who would most benefit.

There have been two systematic reviews published in this area, and both examined bariatric and non-bariatric surgery studies together [15][16]. Due to lack of reporting on common surgical endpoints, they were both unable to draw conclusions on benefits to surgical outcomes, and one review attempted meta-analysis [16], but only three non-bariatric studies were included. In this respect, the present review sheds new light to demonstrate potential risk reduction for three surgical procedures (liver resection, laparoscopic cholecystectomy, and gastrectomy) but also highlights the major gaps in the literature for other surgery types. Given the increasing pressure placed on hospital systems and surgeons to optimise their surgical patients with excess weight due to the rising prevalence of obesity, this research should be prioritised.

Bariatric surgery patients can achieve 2.8 kg to 14.8 kg weight loss with preoperative VLCDs [22]. Further, delaying surgeries such as hernia repairs or laparoscopic cholecystectomy can result in unplanned emergency surgery [23][24], which has an inherently higher risk of complications than elective surgery [25]. Due to these risks, it may be prudent to consider a VLCD as the most appropriate dietary choice for adults awaiting surgery for conditions that may worsen over time due to the rapidity of weight loss it provides when compared with other diets

Few studies in the current review measured common surgical endpoints such as infection or respiratory events, despite the known increased risk of these events for patients with obesity. When measured, very low incidences of these outcomes were found across studies but could not be linked to the preoperative intervention due to underpowered sample sizes and lack of comparative groups. The most commonly reported endpoint in studies with a comparator group was length of stay, with all seven studies showing no significant difference. Despite this, length of stay should continue to be measured in future studies due to the profound implications it has for healthcare facilities and the small sample sizes and number of studies in this review.

Increased BMI is associated with increased costs of surgical care [26][27]. The two outcomes that were found to be impacted by preoperative dietary interventions (blood loss and operating time) have great cost-saving potential. Using operating time as an example, standard operating theatre costs in Australian public hospital facilities, not including equipment costs, are approximately AUD \$7 per minute [28]. Therefore, even a seemingly insignificant reduction in operating time per laparoscopic cholecystectomy procedure could have major benefits, with 49,874 laparoscopic cholecystectomy procedures performed in Australia annually [29]. Furthermore, other hospital-acquired postoperative complications can incur punitive financial penalties at some Australian healthcare facilities [30]. A preoperative intervention that potentially reduces operating time and postoperative complications for adults with excess weight could be considered an investment in surgical care, but studies are required to show definitive economic benefit.

There is a clear association between depletion of lean body mass and poor surgical outcomes [31][32][33], including delayed wound healing, infectious complications, intensive care unit admissions, and longer hospital stays [34]. Despite this, there was a distinct lack of reporting on change to lean body mass in the included studies. Although the two studies that measured this reported no excess loss of lean body mass, this result cannot be assumed across all population groups, such as those with malignancy or awaiting organ transplants who may have underlying dysfunctional metabolic processes. Loss of lean body mass can be mitigated by providing adequate dietary protein [18], but interestingly, only three studies individualised their protein prescription based on body weight, and one study provided only 33 g of protein per day, which would be inadequate to meet protein requirements for any adult with obesity when based on minimum 0.8 g/kg. This highlights the need to ensure adequate protein provision in preoperative weight-loss interventions as a matter of urgency, especially considering the increasing pressure placed on patients to lose weight preoperatively [12][13]. Loss of lean body mass could potentially be avoided by utilising qualified dietitians for dietary prescription and monitoring, but due to the lack of studies in this area that involve dietitians and measure lean body mass, this is still unknown and requires exploration.

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