



Weight loss: the options and the evidence

The benefits of intentional weight loss in people who are overweight are undeniable. However, the vast number of diets, products and lifestyles marketed to consumers presents a challenge for health professionals wanting to recommend healthy, evidence-based and sustainable interventions.

KEY PRACTICE POINTS:

- The overriding principle of weight loss is that energy intake needs to be less than energy expenditure; there is no consistent evidence that any one calorie-restricted diet is better than another at achieving weight loss
- The two most important factors when considering the benefit of a dietary regimen are:
 1. Is the diet healthy, i.e. balanced, nutritious and energy appropriate?
 2. Can the diet be maintained long-term?
- At least 2.5 hours of moderate intensity physical activity per week should be included in all weight loss interventions
- Contrary to popular belief, rapid weight loss is not associated with an increased risk of weight regain compared to gradual weight loss
- Very low-calorie diets (< 800 kcal/d) should only be considered for people who are obese and have a clinical need to rapidly lose weight (e.g. prior to surgery). The diet must be nutritionally complete and followed for a maximum of 12 weeks (continuously or intermittently), and patients should receive ongoing clinical support. Patients should then switch to a maintenance weight loss programme.
- Pharmacological interventions may be considered only after dietary, exercise and behavioural approaches have been initiated and evaluated for people who are obese or as an adjunct to diet and lifestyle interventions, after the potential harms and benefits of treatment have been reviewed
- Bariatric surgery is an effective weight loss intervention that is publicly funded for eligible people according to a national scoring system. It should be considered for people who have not achieved or maintained adequate weight loss, despite engaging with all appropriate non-surgical interventions.

This is a revision of a previously published article.
What's new for this update:


- Evidence supporting lifestyle interventions as an effective strategy for the management and remission of type 2 diabetes is now available in a separate article, see: bpac.org.nz/2021/diabetes-weight.aspx
- A section added on the use of a whole food plant-based diets to support long-term weight management
- Two new pharmacological interventions approved in New Zealand (but not funded) for weight management:
 - Liraglutide (a GLP 1 receptor agonist)
 - Naltrexone + bupropion


Obesity in New Zealand

The proportion of the New Zealand population who are obese is growing. In 2020/21, over one-third of New Zealand adults (1.42 million) had a BMI ≥ 30 kg/m².¹ There are, however, marked differences in the rates of obesity for some groups; Pacific peoples (63%) and Māori (48%) are more likely to be obese than European/Others (29%) and Asians (16%).¹ People living in the most deprived communities are 1.8 times as likely to be obese than those living in the least deprived.¹ Ongoing inequity in the social determinants of health is resulting in an increasing burden of obesity and obesity-related disease (e.g. type 2 diabetes) on Māori and Pacific peoples.²

Studies have shown that Asian populations are at higher risk for type 2 diabetes, high blood pressure and lipid levels at lower BMI thresholds than other ethnic groups;³ for a fixed BMI, New Zealand Chinese have a higher percentage body fat compared to New Zealand Europeans and Asian Indians.⁴ The World Health Organization proposed a lower BMI cut-off for Asians where a BMI of 23 kg/m² is considered overweight.³ New Zealand guidelines recommend considering a lower treatment threshold for Asian patients with central/abdominal obesity.⁵

Achieving a healthy weight underpins the prevention and management of numerous long-term health conditions.⁶ However, halting the obesity epidemic requires societal change. While primary health care professionals are not able to address all of the health determinants relating to obesity, on an individual level they can encourage patients to have healthy lifestyles that prevent excessive weight gain, and offer interventions and support to people who would benefit from a reduction in body weight. Beginning a weight loss journey can be daunting; identifying and addressing any psychological barriers to weight loss and assessing readiness to change will help ensure that the lifestyle, pharmacological or surgical treatments are effective.

 For further information on the effect of weight loss on the management and remission of type 2 diabetes, see: bpac.org.nz/2021/diabetes-weight.aspx

 Information to support patients who are initiating a weight loss plan is available from: www.health.govt.nz/your-health/healthy-living/food-activity-and-sleep/healthy-weight/help-managing-your-weight/getting-started-your-weight-loss-plan

The principles of weight management

Obesity is a chronic disease that results from complex interactions between genetic, metabolic, hormonal, behavioural and environmental factors.⁶ Key lifestyle interventions to promote weight loss include behaviour change strategies, reducing calorie intake, improving the nutritional value of the diet and increasing energy expenditure.⁶ The clinical benefits of weight loss begin once an overweight person loses as little as 5% of their body weight and benefits increase as the ideal weight range is approached. If lifestyle interventions alone are unsuccessful, treatment can be stepped up to include pharmacological or surgical treatment.


Key aspects of weight loss management include:

- Optimising the management of co-morbidities and considering other potential causes of weight gain, e.g. adverse medicine effects, undiagnosed conditions or psychosocial issues
- Developing an individualised plan with SMARTER* goals (**S**pecific, **M**easurable, **A**chievable, **R**elevant, **T**ime-bound, **E**njoyable and evaluate, **R**ecord and reward) and a plan for review and monitoring. Lifestyle changes should be sustainable so that reductions in body weight can be maintained. Individualising management based on cultural factors is also important to support weight loss; for example, a review of studies relating to obesity management in New Zealand primary care demonstrated that including whānau and values such as manaakitanga (enhancing the integrity of the person), pātaka mātauranga (sharing knowledge that leads to understanding and responsibility) and whanaungatanga (support or connectedness) aided the success of interventions.⁷
- Recommending dietary interventions that are affordable and recognise the cultural and social significance of food, e.g. manaakitanga in Māori culture centres on generous hospitality often involving food, and this concept is shared by many other Pacific and Asian cultures
- Recommending behavioural interventions as appropriate, e.g. encouraging regular meals and meal planning,

self-monitoring, stimulus control, stress management, slowing the rate of eating, ensuring social support, problem-solving, thought modification, relapse prevention and strategies to deal with weight regain.⁵ If additional support is needed, referral to weight loss support groups or counselling (depending on local availability).

- Recommending physical activity and exercise interventions that are appropriate for the patient's fitness level and encouraging an increase in intensity as their fitness and mobility improves (see: "Exercise should be included in every weight loss regimen")
- Re-framing the discussion to focus on improving the management of long-term conditions, e.g. type 2 diabetes or dyslipidaemia, rather than weight loss may motivate patients to engage with lifestyle changes or step treatment up to include weight loss medicines, if indicated⁸

* Information for patients on SMARTER goals is available here: www.healthnavigator.org.nz/healthy-living/m/making-changes-goal-setting/

 For further information on psychological and behavioural interventions for obesity management, see:

- Appendix 2 in the Ministry of Health's Clinical guidelines for weight management in New Zealand adults www.health.govt.nz/system/files/documents/publications/clinical-guidelines-for-weight-management-in-new-zealand-adultsv2.pdf
- Canadian adult obesity clinical practice guideline obesitycanada.ca/wp-content/uploads/2020/08/10-Psych-Interventions-2-v3-with-links_FINAL.pdf

Rapid weight loss is not associated with an increased risk of weight regain

Rapid weight loss, e.g. a 10% reduction in body weight over five weeks, is associated with the same risk of weight regain after nine months, compared to a 10% reduction in body weight over three months.⁹ Therefore, even though diets that begin with significant calorie restriction and rapid weight loss may not be sustainable long-term, there is no evidence they are any less successful than those involving more gradual changes, and no more likely to cause a relapse into unhealthy behaviours.

Simply advising people to lose weight makes them more likely to try

Although it can be a confronting topic, health professionals (including doctors, dietitians, nurses and pharmacists) should raise the issue of weight loss if a person is likely to benefit from a reduction in body weight. A meta-analysis of 12 studies

found that people who were advised to lose weight by a health professional in primary care were almost four times more likely to attempt to do so than those who did not receive this advice.¹⁰

Dietary approaches to weight loss


Key features of calorie-restricted diets that are effective for weight loss are summarised in Table 1. In general, the weight loss efficacy of energy-matched dietary regimens with different macronutrient compositions, e.g. low carbohydrate or low-fat, is similar. However, regimens that minimise or "forbid" the intake of particular food groups may result in nutritional deficiencies, e.g. insufficient fibre, iron or calcium, or excessive intake of saturated fat. These diets are also often not sustainable in the long-term or practical to manage, e.g. family meals may not be easy to adapt or there may be difficulties in finding foods to match the diet when dining out or at other people's homes.

The two most important factors, therefore, in determining the benefit of a dietary regimen are:^{5,11}

1. Is the diet healthy, i.e. balanced, nutritious and energy appropriate?
2. Can the diet be maintained long-term, e.g. is it affordable, sustainable within a person's lifestyle and with their co-morbidities, and is it culturally and socially acceptable?

Referring to a dietitian

People with sub-optimal nutrition may benefit from a discussion with a dietitian. Funded consultations for people who are obese are generally for those with diabetes and uncontrolled hyperglycaemia, although referral criteria differ between DHBs. Dietitians are also available privately.

 Contact details for local dietitians are available from: dietitians.org.nz

Dietary supplements: no evidence of effectiveness and may cause adverse effects

Advise people against using dietary supplements, e.g. amarantaceae, garcinia and other botanicals, for weight loss as there is no evidence of benefit, often the safety has not been established and they may interact with medicines. Supplements may be unaffordable for many patients and can be associated with adverse effects such as liver failure, colitis and gastrointestinal irritation.²³ Some supplements contain caffeine or capsaicinoids that may increase energy expenditure to promote weight loss, but can result in tachycardia or arrhythmias, which is problematic in people with pre-existing cardiac conditions.²³

Similarly, there is no conclusive evidence that herbal preparations, slimming teas or high fibre tablets as appetite

Table 1: Dietary regimens with evidence of effectiveness for weight loss or reduced cardiovascular disease (CVD) risk.⁵


Name	Description	Positives	Negatives	
Modified macronutrient	<p>Mediterranean www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/mediterranean-diet/art-20047801 (Recommended by the Ministry of Health)</p>	<p>Three strategies:</p> <ol style="list-style-type: none"> 1. Increased consumption of omega-3 fats from fish and plant sources 2. Substitution of saturated and trans fats for non-hydrogenated unsaturated fats 3. Consumption of a diet high in fruit, vegetables and whole grains to increase fibre and antioxidant intakes and consumption of very few products made from refined grains <p>Vegetables and fruit are central, monounsaturated fats are prominent, sourced mainly from olive oil. Includes cereals, nuts and legumes, a moderate amount of poultry, fish and dairy products and little to no red meat.</p>	<p>A substantial amount of supporting short and long-term evidence, including a lower risk of CVD events, reduced triglycerides, a reduced risk of diabetes, lower HbA_{1c} and reduced circulation of inflammatory markers^{12,13}</p>	<p>Serving sizes are not specified and it can be difficult to estimate calorie intake. Iron intake may be insufficient, and supplementation may be required.</p>
	<p>Low fat, e.g. Dietary approach to stop hypertension (DASH) www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/dash-diet/art-20048456 www.diabetes.co.uk/diet/dash-diet.html (Recommended by the Ministry of Health)</p>	<p>Includes vegetables, fruits, fish, nuts and low-fat dairy products that are naturally low in sodium. Red meat may be eaten in moderation.</p>	<p>Associated with lower blood pressure and a reduced risk of CVD and type 2 diabetes, and improved glycaemic control and blood lipid profile.¹² Although not intended as a weight loss programme, weight loss may result as the diet facilitates healthier meal and snack choices.</p>	<p>Serving sizes are not specified and it can be difficult to estimate calorie intake</p>
	<p>Low (and very low) carbohydrate*, e.g. Atkins, ketogenic† www.mayoclinic.org/healthy-lifestyle/weight-loss/in-depth/low-carb-diet/art-20045831 (Very low carbohydrate [ketogenic] diets are not recommended by the Ministry of Health)</p>	<p>Low carbohydrate diets contain ≤ 40% of total energy from carbohydrates. Very low carbohydrate diets contain < 20% (20 – 60 g/day).⁵ Red meat, poultry, fish, shellfish and eggs are the primary source of nutrition. The saturated fat content may be particularly high in versions marketed as ketogenic.</p>	<p>Associated with reductions in blood pressure, triglyceride levels, HbA_{1c} and insulin resistance.^{14,15} Ketogenesis may cause a reduction in appetite.¹³</p>	<p>Fibre and micronutrient consumption may be inadequate, consumption of saturated fat may be excessive. High LDL-C as a result of ketogenic diets may compromise artery function and worsen heart disease.¹⁶ Initial adverse effects include low energy levels, "brain fog", increased hunger, sleep problems, nausea, digestive discomfort, bad breath and poor exercise performance. Hard to sustain in the long term and most of the initial weight loss seen is often associated with fluid losses.¹⁶</p>
<p>Paleo www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/paleo-diet/art-20111182 (Paleo diets are not recommended by the Ministry of Health)</p>	<p>Focuses on foods theoretically eaten during early human evolution, e.g. lean meat, fish, vegetables, eggs, nuts and berries, and avoids grains, dairy, salt, refined fats, sugars and processed foods. Often lower in carbohydrate, higher in protein and moderate to high in fat; however, the macronutrient profile can differ substantially depending on the palaeolithic culture/region inspiring the specific paleo diet.</p>	<p>Includes some patterns of behaviour known to be beneficial, e.g. drinking water, limiting refined sugar.</p>	<p>Only a few small studies of short duration have been conducted with mixed effects on weight, HbA_{1c} and lipids.¹⁵ Requires the elimination of two whole food groups (dairy and grains). There is a risk of nutrient inadequacy (e.g. fibre, calcium, iron and vitamin D) and it may be difficult to follow. Ensuring adequate calcium is of particular concern, particularly for those at risk of osteoporosis.¹⁷</p>	

* It is thought that these patterns of eating shift the body away from glucose as a source of energy and towards fatty acids and fatty-acid derived ketones, at the same time fat storage is reduced²²

† Ketogenic diets are very low in carbohydrate and high in fat

Plant-based	<p>Whole food plant-based diets</p> <p>www.healthline.com/nutrition/plant-based-diet-guide#foods-to-eat</p> <p>www.bda.uk.com/resource/vegetarian-vegan-plant-based-diet.html</p>	<p>Focuses on consuming foods in their most natural form, e.g. grains, legumes, vegetables, fruit and nuts. Excludes heavily processed and refined foods and avoids or limits meat, eggs and dairy.</p>	<p>Long-term sustainable method of significant body weight reductions despite no caloric or portion size restrictions.¹⁸</p> <p>Associated with a slight raise in resting metabolic rate, reduced risk of type 2 diabetes, CVD and hypertension.¹⁸</p> <p>May be protective against insulin resistance.¹⁸</p>	<p>May provide insufficient daily quantities of vitamins B12 and D, and calcium; encourage a wide variety of plant-derived foods to ensure the diet is balanced and sustainable. Supplements may be necessary.</p> <p>Vegans need to ensure a reliable source of vitamin B12.</p> <p>If excluding dairy, vegan sources of calcium or supplementation is necessary.</p>
	<p>Vegetarian or vegan</p> <p>www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/vegetarian-diet/art-20046446</p> <p>www.bda.uk.com/resource/vegan-diet-healthier-way.html</p>	<p>Those who follow plant-based diets are categorised as:</p> <ul style="list-style-type: none"> ■ Lacto-ovo vegetarian: eat dairy foods and eggs but not meat, poultry or seafood ■ Ovo-vegetarian: include eggs but avoid all other animal foods, including dairy ■ Lacto-vegetarian: eat dairy foods but exclude eggs, meat, poultry and seafood ■ Vegan: exclude all animal products including dairy, eggs, and sometimes honey 	<p>Vegetarian diets, including vegan diets, are associated with improved cardiometabolic risk factors, and a reduced risk of type 2 diabetes and CVD.¹²</p>	<p>Requires calorie restriction to be effective for weight loss.</p> <p>May include high amounts of saturated fats, e.g. coconut oil, and processed foods high in calories, sugar and sodium.</p> <p>Vegan regimens may be low in iron, vitamin B12, calcium and iodine and supplementation may be required.</p>
	<p>Very low energy*</p> <p>www.nhs.uk/live-well/healthy-weight/very-low-calorie-diets/</p>	<p>Typically used for rapid weight loss over 8 to 12 weeks prior to a weight loss maintenance programme or if there is clinical need to lose weight rapidly (e.g. prior to surgery).¹⁹ Energy intake is usually < 3350 kJ/day (< 800 kcal/d).¹⁹</p> <p>Food usually replaced with a nutritionally balanced product (e.g. shake, soup, bar) with high protein content to minimise the loss of lean tissue, supplemented with vitamins, minerals, electrolytes and fatty acids.</p>	<p>Reductions in BMI, blood pressure and triglycerides can lead to long-term weight management, reduced CVD risk and obesity related co-morbidities (e.g. diabetes).⁵</p> <p>May cause a reduction in appetite.²⁰</p>	<p>Hard to sustain and should generally only be used for short periods (< 12 weeks), ideally under medical supervision, before switching to a maintenance diet. No guidance on food selection is provided; education may be required to ensure healthy options are chosen during the weight maintenance phase.</p> <p>Not appropriate for many people, e.g. children, pregnant women, people aged over 65 years, those with eGFR < 30 mL/min/1.73m² or recent acute coronary syndrome.⁵</p> <p>The reduced energy intake may cause transient adverse effects including alopecia, tiredness, dizziness and cold intolerance.</p> <p>Regular follow ups are required which may not be achievable for some people or able to be offered by some clinics; follow-up by phone may be an appropriate solution in some cases.</p>
	<p>Intermittent fasting*</p> <p>www.hsph.harvard.edu/nutritionsource/healthy-weight/diet-reviews/intermittent-fasting/sciencebasedmedicine.org/intermittent-fasting/</p>	<p>A pattern of eating that cycles between energy restriction and non-fasting. The most common is the 5:2 dietary regimen where a normal calorie intake of healthy food is maintained for five days per week and substantially less eaten on two days, e.g. 2100 – 2500 kJ/day (500 – 600 kcal).⁵</p> <p>Time-restricted eating is another type of intermittent fasting that involves fasting for at least 12 hours every 24 hours, e.g. by abstaining from food from 7 pm – 7 am.</p> <p>There is no compelling evidence to support other types of short-term “fasts”, e.g. the cabbage soup diet, for long-term weight loss; many of these diets involve extremely low caloric intake, and people often regain weight once a normal diet is resumed.</p>	<p>Intermittent fasting is as effective as a continuous energy restricted dietary regimen in terms of weight loss.⁵ However, some people may find intermittent fasting easier to adhere to rather than reducing the amount of food they eat every day. Furthermore, with time restricted eating, the focus is on when to eat, not on what to eat.</p>	<p>Little is known about the long-term risks and benefits.</p> <p>It is not known what the optimal timing of fasting or level of calorie restriction is to achieve maximal weight loss.</p> <p>Some concerns that people may consume excess calories on the non-fasting days, however, studies to date have not found this to be the case compared to other weight loss methods.</p> <p>People with diabetes who take insulin or sulfonylureas are at increased risk of hypoglycaemia on fasting days.²¹ Requires planning and frequent monitoring to ensure appropriate dose adjustment on fasting days to reduce this risk.²¹ Not recommended for people with type 1 diabetes. Also not suitable for adolescents or during pregnancy or breastfeeding.</p>

suppressants, are effective for inducing long-term weight loss, and excessive use may cause nausea, vomiting, abdominal pain and diarrhoea.²⁴

 Patient information on weight loss supplements is available from: ods.od.nih.gov/pdf/factsheets/WeightLoss-Consumer.pdf#search=%22chitosan%22

Exercise should be included in every weight loss regimen

Exercise alone is less effective than a calorie-restricted diet for achieving weight loss.²⁵ However, some form of physical activity should be included in every weight loss intervention as it augments weight reduction, helps maintain weight loss and confers additional benefits, e.g. increased muscle mass and fitness, decreased central adiposity, and improved cardiovascular and mental health.^{25, 26}

Recommend that people start with exercises they enjoy, are familiar with and are appropriate for their age and capabilities. In general, weight bearing exercises are more effective at reducing BMI than non-weight bearing exercise. For example, walking or jogging uses approximately 30% more energy over the same time period than swimming or cycling.²⁷


The amount and type of exercise should be extended as fitness improves.


How much physical activity is recommended?

Discussions with patients about physical activity can be guided by the following points:^{11, 26}

1. Sit less and move more, e.g. after sitting for 30 minutes, get up from your seat and walk around
2. Do at least 2.5 hours of moderate activity per week*, e.g. brisk walking, swimming, playing social games/sports, gardening, vacuuming, mowing the lawn. This can be reduced by half if it is vigorous activity*, e.g. running, hill walking, fast cycling, aerobic dancing, competitive sports, carrying heavy loads, shovelling/digging.
3. For additional benefits increase the duration of moderate to vigorous activity; all adults should be encouraged to do more physical activity than is recommended to balance the effects of high levels of sedentary behaviour
4. Perform muscle strengthening activities two days of each week
5. Some level of physical activity is better than none; reducing sedentary time and increasing physical activity of any intensity is beneficial

* Moderate activity noticeably increases heart rate; vigorous activity causes rapid breathing and a substantial increase in heart rate. Exercise intensity is dependent on fitness level and mobility.

 Further information about types of physical activities suitable for different age groups is available from: www.health.govt.nz/your-health/healthy-living/food-activity-and-sleep/physical-activity

 Diabetes New Zealand provides exercise suggestions including activities appropriate for those with an injury or disability, available from: www.diabetes.org.nz/type-2-diabetes-physical-activities

Maintaining positive change

Following a reduction in body weight, changes in appetite-regulating hormones make maintenance of weight loss difficult.²⁵ The hormone ghrelin that causes hunger may remain increased for several years and leptin, which decreases hunger, is suppressed.²⁸ Furthermore, a person's resting metabolic rate slows following weight loss which also makes weight regain more likely.²⁵


To counteract these physiological and metabolic changes people need long-term monitoring and support in primary care; accountability may be a motivating factor for some people to maintain weight loss. A recent randomised controlled trial showed that telephone follow-up after a lifestyle weight loss intervention was more effective at reducing weight regain than education alone.²⁹ While the cost and time involved in individual telephone sessions is a major barrier to implementing this in primary care, people can be encouraged to instigate a 'buddy' system or join a group to maintain (or continue) their weight loss.


Other services and groups which can help with ongoing support include:

- Green Prescription
- Whānau Ora providers
- Weight loss groups: www.meetup.com/topics/weightloss/nz/
- Walking groups, e.g. Walking New Zealand: www.walkingnewzealand.co.nz/walking-groups or Parkrun (participants can walk, jog or run): www.parkrun.co.nz
- Community fitness classes, e.g. Zumba

Little is known about the benefits of smart phone apps

Smart phone apps and activity tracking devices may be useful for some people to monitor dietary intake or record (and potentially share) the duration and intensity of exercise. In general, mobile health technology is associated with positive behaviour change, e.g. increased consumption of vegetables and fruits and more physical activity, however, little data are available on long-term effectiveness.³⁰

 New Zealand based nutrition/healthy eating and exercise app reviews used are available from: www.healthnavigator.org.nz/apps/n/nutrition-apps/ and www.healthnavigator.org.nz/apps/e/exercise-apps/

 Nutrition Apps reviewed by a Registered Dietitian can be found here: dietitians.org.nz/public-info

Pharmacological interventions for weight management

There are four medicines approved for weight loss in New Zealand (none funded; Table 2): liraglutide, phentermine, orlistat and naltrexone + bupropion. These medicines are associated with modest weight loss which must be balanced against the risk of adverse effects. Weight loss medicines can augment the extent of weight loss beyond which dietary and lifestyle interventions can achieve alone, and some can also help to prevent weight regain.⁵ Current Ministry of Health advice is that medicines for weight loss should only be considered when:⁵

- Lifestyle changes have not produced clinically significant benefits after six months; and
- The person has a BMI ≥ 30 kg/m²*

Patients who are taking medicines for weight loss should be monitored monthly for the first three months.⁵ Treatment beyond three months should not be considered unless the patient is tolerating the medicine, a clinically significant benefit has occurred, e.g. $\geq 5\%$ reduction in body weight, and there are no concerns about ongoing treatment.⁵

* Liraglutide, naltrexone + bupropion and phentermine are also indicated for use in people with a BMI ≥ 27 kg/m² if they have at least one weight related co-morbidity, e.g. impaired glucose tolerance, hypertension, dyslipidaemia or obstructive sleep apnoea³²


Laxatives should not be used for weight loss. There is no evidence to support the use of over the counter or prescription laxatives for weight loss.⁵ In general, most laxatives act on the large intestine, while the majority of food processing and ensuing calorie intake occurs in the small intestine.³¹ Any short-term weight reduction after taking laxatives is not sustainable as it is mostly due to temporary fluid loss; overuse can lead to dehydration and electrolyte disturbances, and in some cases dependence.³¹

Metformin may be considered for people at high risk of type 2 diabetes

Metformin is the first-line medicine for most people with type 2 diabetes. The main actions of metformin are to decrease gluconeogenesis and increase peripheral utilisation of glucose.³²

The use of metformin may contribute to weight loss and the prevention of diabetes (unapproved indication) in people

who are at high risk of type 2 diabetes, i.e. HbA_{1c} 41 – 49 mmol/mol.⁴⁰ Metformin is occasionally used to assist with weight loss in people with a HbA_{1c} ≤ 40 mmol/mol (unapproved indication). A recent retrospective cohort study found that the average weight loss at six and 12 months for patients with type 2 diabetes/pre-diabetes was approximately 6.5 kg and 7.3 kg, respectively.⁴¹ A meta-analysis demonstrated that people who were overweight or obese without diabetes lost 2.3 kg following the use of metformin for three to four months, compared to people treated with a placebo.⁴²

 For information on metformin dosing, adverse effects and interactions with other medicines, refer to the New Zealand Formulary: www.nzf.org.nz/nzf_3715

Surgical interventions for weight loss

Bariatric surgery is a major and generally irreversible weight loss procedure, superior to non-surgical weight loss interventions. Surgery is effective for motivated patients who are able to maintain lifelong altered eating habits and lifestyle change.⁵ One year after bariatric surgery, weight loss can be 40 – 50 kg with significant improvements in blood pressure, lipid levels and HbA_{1c} (including remission of diabetes), obstructive sleep apnoea, gastro-oesophageal reflux and venous circulation.^{5,43} Unlike dietary or pharmacological approaches, some types of bariatric surgery may change the body fat 'set point'* such that it is permanently set at a lower level. People undergoing bariatric surgery have been found to maintain their new, lower body weight for 20 years or more and to live longer on average than individuals not receiving surgery, presumably due to reduced health risks.^{43,44} The Swedish Obese Subjects study (N = 2,010) found that compared with matched controls, those who underwent bariatric surgery had:⁴⁴

- A > 3-fold increase in diabetes remission rate at 10 years post-surgery
- A risk reduction in overall mortality of 30% at 16 years post-surgery
- A mean reduction in body weight of 18% at 20 years post-surgery

Certain inclusion criteria must be met before a patient is considered for publicly funded bariatric surgery. Bariatric surgery can also be accessed privately; acceptance criteria is likely to vary between clinics.

* For further information on bariatric surgery and body weight set point, see: www.obesityaction.org/resources/body-weight-set-point-what-we-know-and-what-we-dont-know/


 For information on the referral process for bariatric surgery, see: www.health.govt.nz/publication/clinical-guidelines-weight-management-new-zealand-adults

Table 2: Medicines approved (but not funded) for weight loss in New Zealand.³² For information on dosing, monitoring, adverse effects and interactions, refer to the New Zealand Formulary: www.nzf.org.nz

Medicine	Class	Mechanism of action	Evidence	Notes
Liraglutide (injectable)	Glucagon-like peptide 1 (GLP-1) receptor agonist*	Reduces appetite and increases satiety	Liraglutide, 3 mg daily, for 56 weeks alongside healthy diet and physical activity achieved an 8% weight reduction and improvements in systolic blood pressure, lipid profiles, HbA _{1c} and fasting glucose levels ³³	Administered as a once daily subcutaneous injection, starting at a dose of 600 micrograms, daily, and titrating upwards to a maintenance dose of 3 mg, daily. Generally well-tolerated; common adverse effects include gastrointestinal disturbance, e.g. nausea, constipation or diarrhoea. Patients often regain weight over time, it is therefore recommended to continue taking this medicine for at least 12 months and to continue with lifestyle changes to maintain weight loss in people who respond. ³⁴ Does not increase the incidence of CVD in people with obesity and type 2 diabetes; provides renal protection in people with type 2 diabetes. ³³ Cost of treatment may be prohibitive for many people.
Naltrexone + bupropion (oral)	Opioid receptor antagonist (naltrexone) Selective noradrenaline and dopamine re-uptake inhibitor (bupropion)	Reduces appetite and increases energy expenditure; controls food cravings and modifies eating behaviours	Mean weight loss in participants who responded to treatment [†] of approximately 12% at week 56; 85% of these participants achieved weight loss of at least 5% at week 56 ³⁵	Generally well-tolerated, but contraindicated in some patient groups, e.g. those with current seizure disorder or a history of seizures, bipolar, opiate dependence or withdrawal. Increased risk of serotonin syndrome when bupropion is taken with other serotonergic medicines, e.g. a SSRI. Nausea is a common adverse effect; it is usually transient and slow dose titration may help to manage this. Patients can develop elevated heart rate or blood pressure and these should be monitored at baseline and then at regular intervals. ³⁶ If weight loss of at least 5% of initial body weight has not been achieved after 16 weeks, treatment should be discontinued.
Phentermine (oral)	Dopaminergic agonist	Appetite suppressant	Limited trials assessing phentermine as a monotherapy; 15 – 40 mg induced weight loss of 3.6 – 4.5 kg at six months without increasing CVD or death ³⁷	Indicated for short-term use only, i.e. < 3 months. Contraindications include cardiac abnormalities and hypertension. ³² May have addictive potential (as it is a sympathomimetic); be alert for signs of dependence.
Orlistat (oral)	Selective pancreatic lipase inhibitor	Reduces fat digestion and absorption, which is excreted in the stool	Modest weight loss (2 – 3% of total body weight after one year) ^{33, 37}	Low-fat diet required to avoid excessive fatty or oily stools. Adverse effects can be significant, e.g. faecal urgency, flatulence, cramps, bloating and impaired absorption of fat-soluble vitamins. These symptoms may indicate that the patient is eating too much fat, which may motivate them to reduce their intake. ³² Slowly titrating the dose or adding psyllium fibre to the diet may reduce gastrointestinal adverse effects. ³⁸

* Dulaglutide, which is also a GLP-1 receptor agonist, promotes greater reductions in HbA_{1c} than liraglutide, however, the extent of weight loss and cardiovascular protection are similar.³⁹ Patients may prefer to take dulaglutide because of its once weekly injectable dosing regimen, rather than the daily dosing and titration required with liraglutide treatment. People with type 2 diabetes may be eligible for funded dulaglutide treatment and some people who do not have diabetes may benefit from off label and unfunded use of dulaglutide for weight loss. Further information on dulaglutide is available from: bpac.org.nz/2021/diabetes.aspx

† Defined as ≥ 5% weight loss at week 16 of treatment³⁴

Supporting patients who have undergone bariatric surgery

The goal during the first one to eight weeks following bariatric surgery is to maintain hydration and to ensure protein and nutrient intake is sufficient to allow healing and prevent muscle loss while the patient returns to solid food.⁴⁵ Dietitians have an important role in the multidisciplinary team, both before and after bariatric surgery, and will help to guide this process.⁴⁵

The long-term use of mineral and multivitamin supplements is recommended including iron, folic acid, thiamine and vitamin B12.⁴⁵ Request a full blood count and analysis of iron, vitamin B12, serum calcium, magnesium, phosphate and albumin every six months for the first two years and then annually.⁴⁵ Patients should be monitored for signs of protein deficiency which can occur in the first months after the procedure, e.g alopecia, poor wound healing, muscle weakness.⁴⁵

Alcohol should be avoided, or consumed in moderation, as its metabolism may be impaired following bariatric surgery. Pregnancy is not recommended for at least two years.^{5,45}

The bottom line: weight loss requires a life-long commitment

Weight loss is a journey rather than a destination, both for patients and the health professionals assisting them. The long-term lifestyle changes needed to achieve sustainable weight loss require continual commitment, motivation and perseverance from the person themselves and ongoing support from family, friends and health professionals. The role of the primary care team is to encourage people to maintain positive change and to offer additional advice as people age and their health or circumstances change.

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Patient resources:

Websites:

- The Heart Foundation has a selection of approximately 400 healthy recipes available from: www.heartfoundation.org.nz/wellbeing/healthy-recipes
- A list of fibre-rich foods is available from: nutritionfoundation.org.nz/nutrition-facts/nutrients/carbohydrates/fibre
- The healthy heart visual food guide indicates the relative quantities of food groups that should be eaten. Versions in Te Reo Māori and several Pacific Island and Asian languages are available from: www.healthnavigator.org.nz/healthy-living/h/healthy-heart-visual-food-guide/

Handouts:

- Handouts for patients including healthy eating, activity advice and serving size guides are available from: www.healthed.govt.nz/resource/healthy-eating-active-living and www.nutritionandactivity.govt.nz/nutrition

Apps:

- The “My Diabetes Journey” app contains helpful resources from the Diabetes New Zealand “Take Control Toolkit”, including recipes, nutritional information and advice: www.diabetes.org.nz/my-diabetes-journey-app
- FoodSwitch can scan the barcodes of packaged foods. It provides nutritional information about foods and can suggest similar foods that are healthier: www.foodswitch.co.nz/content/about-foodswitch
- Easy Diet Diary NZ can count calories, track diet and exercise and scan barcodes. This app is most useful for people wanting to monitor energy intake on a regular basis: www.healthnavigator.org.nz/apps/e/easy-diet-diary-nz/



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