



Weight loss: the options and the evidence

The benefits of intentional weight loss in people who are overweight are obvious and 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
- Pharmacological interventions for weight loss generally have limited long-term effectiveness, however, short-term use may be considered for people who are obese as an adjunct to 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 selected people according to a national scoring system

Obesity in New Zealand

The proportion of the New Zealand population who are obese is growing. In 2017/18, almost one-third of New Zealand adults (1.26 million) were obese.¹ There are, however, marked differences in the rates of obesity for some groups; Māori (48%) and Pacific peoples (65%) are more likely to be obese than European/Others (31%) and Asians (15%).¹ People living in the most deprived communities are 1.6 times more likely to be obese than those living in the least deprived.¹

Halting the obesity epidemic requires societal change at a population level. While primary health care professionals may not be able to address all the health determinants of 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 bodyweight.

The benefits of weight loss

An unhealthy diet and elevated body mass index (BMI) are the two leading individual risk factors for illness, disability and premature death in New Zealand.² Excessive body weight is associated with type 2 diabetes, hypertension, cardiovascular

disease, atrial fibrillation, reduced mental health, gout, osteoarthritis, non-alcoholic fatty liver disease, some cancers, reduced fertility and obstructive sleep apnoea.³

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.

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

All health professionals 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.⁴

The principles of weight loss management

The overriding principle of weight loss is that people need to consume less energy than they are expending. It is also critically important that any lifestyle changes that result in weight loss are sustainable otherwise the reduction in body weight will not be maintained. Therefore, dietary interventions need to be affordable and recognise the cultural and social significance of food. For example, manaakitanga in Māori culture centres on generous hospitality often involving food, and this concept is shared by many other Pacific cultures. People need to be able

Weight loss for the prevention and treatment of diabetes

Obesity is contributing to the increasing rate of type 2 diabetes in New Zealand, most notably in people aged under 40 years. The outcomes for these people are worse than for adults diagnosed later in life as end-organ damage, e.g. diabetic kidney disease, retinopathy and neuropathy, develop over time and the lifetime risk of cardiovascular disease and early mortality is higher at a younger age.⁵

Lifestyle change can prevent type 2 diabetes in people who are overweight or obese

A randomised trial of 3,234 people without diabetes but with elevated fasting glucose and a mean BMI of 34 kg/m² found that a lifestyle intervention aiming for ≥ 7% reduction in bodyweight, including a nutritionally balanced, low calorie, low fat dietary regimen and at least 150 minutes of exercise per week, was effective at preventing the onset of diabetes.⁶ The number needed to treat for three years to prevent one case of type 2 diabetes with lifestyle interventions was approximately seven.⁶

Remission of type 2 diabetes with weight loss

A substantial number of people with type 2 diabetes who are overweight can achieve a non-diabetic state if they are able to lose enough body weight. This was demonstrated by the DiRECT trial which involved 306 primary care patients in the United Kingdom with a BMI of 27–45 kg/m² and a mean HbA_{1c} of 60 mmol/mol who had been diagnosed with type 2 diabetes in the past six years and were not using insulin.⁷ The intervention involved half the group having their meals replaced with a nutritionally balanced liquid diet (825–853 kcal per day) for three to five months.⁷ At the start of the intervention all glucose-

lowering and antihypertensive medicines were withdrawn and participants were provided with diet and lifestyle advice and monthly follow-ups.⁷ At 12 months the mean weight of the intervention group had fallen by 10% and 46% of individuals had achieved diabetes remission, i.e. a sustained HbA_{1c} less than 48 mmol/mol.⁷ At 24 months the mean weight loss of the intervention group was 7.6% and 36% had diabetes remission.⁸ Remission of diabetes was strongly correlated with the degree of weight loss; at 12 months 86% of people who lost 15 kg or more achieved remission, compared to 7% of those who lost less than 5 kg.⁷

The DiRECT trial successfully demonstrated that type 2 diabetes can be reversed with weight loss. However, the intervention in this study was intensive and may be difficult to achieve in the “real world” without the accompanying health care resources and support. The balance of evidence suggests that the magnitude of weight loss is the key factor in achieving diabetes remission and it does not matter how this is achieved, as long as it is sustainable.⁹

Weight loss improves cardiovascular outcomes in people with diabetes

If people with diabetes do not achieve remission after losing weight, it is likely that they will still benefit from the improved cardiovascular outcomes associated with weight loss. For example, the Look AHEAD trial in overweight or obese people with type 2 diabetes found that each 7% reduction in bodyweight was associated with a 15% reduction in the risk of cardiovascular death, myocardial infarction, stroke or hospitalisation due to angina.¹⁰

to continue to enjoy eating and participate in social events that involve food.

Assessing people who are overweight

Before a person begins a weight loss regimen, optimise the management of any co-morbidities. Also consider potential causes of weight gain including adverse effects of medicines, e.g. corticosteroids, sulphonyureas, insulin, antipsychotics, and undiagnosed conditions, e.g. polycystic ovary syndrome, hypothyroidism.¹¹

Measure HbA_{1c} levels and undertake a cardiovascular risk assessment from age 35 years in males who are obese and 45 years in females who are obese; begin CVD risk assessment five years earlier in Māori, Pacific and South-Asian peoples.¹²

Monitoring body weight

Guidelines recommend recording BMI and waist circumference* initially to guide discussions about the risks associated with excess body weight, and then monitoring weight regularly.³ In practice, however, some patients find being weighed embarrassing or a cause of anxiety and may avoid consultations because of this. Consider the patient's preference and decide together whether measuring weight and tracking changes will help or hinder progress, e.g. if a person is visibly obese measuring weight will not change management advice. Most patients will agree to monitor their own weight at home; ensure they understand that an overall downward trend is the goal and transient increases or plateaus in weight are not uncommon and should not be cause for losing motivation.

* A waist circumference > 80 cm in females and > 94 cm in males is associated with an increased risk of type 2 diabetes, hypertension and cardiovascular disease; a waist circumference > 88 cm in females and > 102 cm in males substantially increases this risk.¹¹

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

It was previously recommended that the optimal rate of weight loss was 1 – 4 kg per month due to concerns that more rapid rate weight loss would encourage unsustainable changes in lifestyle and inevitable weight regain. Evidence now shows that rapid weight loss, e.g. a 15% reduction in body weight in three months, is associated with the same risk of weight regain after two years, compared to a 15% reduction in body weight over nine months.¹³ Rapid weight loss, however, may be associated with a slightly increased risk of cholecystitis.¹³

Review the use of medicines as weight loss occurs

People who are obese are often taking medicines to reduce their cardiovascular risk. As weight loss occurs it is appropriate to review the use of these medicines. For example, weight loss is often associated with a decrease in blood pressure, which may mean that a reduction in the dose or number of

antihypertensives is needed. Glucose-lowering medicines may also require dose adjustments or withdrawal if glycaemic control improves.


Talk to people about their lifestyle

It is important to gain insight into a person's lifestyle before providing them with specific advice. This discussion should include:

- A description of the types and amount of food and drink consumed in a typical week
- How meals are prepared and by whom
- The amount and intensity of physical activity per week
- Previous attempts at weight loss

The discussion should be non-judgemental so the patient feels they can provide honest answers without feeling embarrassed or ashamed.

The aim of weight loss advice should be achievable goals.³ Recommendations may start with simple changes, e.g. switching sugar-sweetened drinks for water, and gradually expand to overall lifestyle change (see: "Discussion points for a healthy lifestyle"). Motivational interviewing may encourage people to make changes by expressing empathy about the barriers to change and collectively devising strategies to overcome them. A good way to ensure the patient has understood is to ask them to explain the information back to you.

 Further information on motivational interviewing is available from: www.healthnavigator.org.nz/clinicians/motivational-interviewing

Recommending a healthy dietary regimen

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.

The two most important factors, therefore, in determining the benefit of a dietary regimen are: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 culturally and socially acceptable?

Referring to a dietitian

People with sub-optimal nutrition may benefit from a discussion with a dietitian. Subsidised 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.

 The contact details for local dietitians are available from: <https://dietitians.org.nz/>

Exercise should be included in every weight loss programme

Exercise alone is less effective than a calorie-restricted diet for achieving weight loss.²¹ However, some form of physical activity should be included in all weight loss interventions as it augments weight reduction and confers additional benefits, e.g. improved cardiovascular and mental health. A synthesis

of systematic reviews found that weight loss interventions that included dietary advice, counselling and exercise were more effective than interventions including dietary advice and counselling alone.²² Physical activity has also been shown to be beneficial in helping patients maintain a reduced body weight once they have lost weight.²³

Recommend that people start with exercise that they enjoy, are familiar with and is 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.²⁴

The amount of exercise should be extended as fitness improves to increase the benefit, e.g. parking the car progressively further away from the destination, getting off the bus several stops earlier, increasing the number of stairs that are climbed or adding another type of activity.

Table 1: Dietary regimens with evidence of effectiveness for weight loss or reduced CVD risk³

Name	Description	Positives	Negatives
Mediterranean www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/mediterranean-diet/art-20047801	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 or no red meat.	A substantial amount of supporting short and long-term evidence, including a lower risk of cardiovascular events, reduced triglycerides, a reduced risk of diabetes and lower HbA _{1c} . ¹⁴	Serving sizes are not specified and it can be difficult to estimate calorie intake. Iron intake may be insufficient and supplementation may be required.
Dietary approach to stop hypertension (DASH) www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/dash-diet/art-20048456	Includes vegetables, fruits, fish, nuts and low-fat dairy products that are naturally low in sodium. Red meat may be eaten in moderation.	Associated with lower blood pressure and a reduced risk of cardiovascular disease, diabetes and cancer. ¹⁴	Serving sizes are not specified and it can be difficult to estimate calorie intake.
Very low carbohydrate* www.mayoclinic.org/healthy-lifestyle/weight-loss/in-depth/low-carb-diet/art-20045831	Contains < 20% of total energy from carbohydrate (20–60 g per day). 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.	Associated with reductions in blood pressure, increased HDL-C and lower triglycerides, and reductions in HbA _{1c} . ¹⁴ Ketogenesis may cause a reduction in appetite. ¹⁵	Fibre and micronutrient consumption may be inadequate, consumption of saturated fat may be excessive. High levels of animal protein are associated with increased insulin resistance. ¹⁶ Typically hard to sustain and therefore often used for short periods.

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Name	Description	Positives	Negatives
<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 8–12 weeks prior to a weight loss maintenance programme.¹⁷ Energy intake is usually < 3350 kJ (800 kcal) per day.¹⁷</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>Many people with type 2 diabetes who are overweight or obese can achieve remission if they lose > 15 kg of body weight (see: “Weight loss for the prevention and treatment of diabetes”). May cause a reduction in appetite.¹⁵</p>	<p>Hard to sustain and often used for short periods. No guidance on food selection is provided therefore education may be required to ensure healthy options are chosen during the weight maintenance phase. 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.⁷ The reduced energy intake may cause transient adverse effects including alopecia, tiredness, dizziness and cold intolerance.</p>
<p>Intermittent fasting*</p> <p>www.hsph.harvard.edu/nutritionsource/healthy-weight/diet-reviews/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 (500-600 kcal) per day.</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 7pm – 7am.¹⁸</p>	<p>Intermittent fasting is as effective as a continuous energy restricted dietary regimen in terms of weight loss. However, some people may find intermittent fasting easier to adhere to rather than reducing the amount of food they eat every day.</p>	<p>Little is known about the long-term risks and benefits. Fasting is associated with an increased risk of hypoglycaemia in patients with type 2 diabetes who are taking sulfonylureas or insulin.¹⁹</p>
<p>Vegetarian or vegan</p> <p>www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/vegetarian-diet/art-20046446</p>	<p>Vegetarian excludes meat as a source of food but includes egg and dairy. Vegan excludes all meat and animal-derived foods.</p>	<p>Associated with a reduced risk of diabetes and lowered LDL-C.¹⁴</p>	<p>Requires calorie restriction to be effective for weight loss. May include high amounts of saturated fats, e.g. coconut oil, and processed foods high in calories, sugar and sodium. Vegan regimens may be low in iron, vitamin B12, calcium and iodine and supplementation may be beneficial.</p>
<p>Paleo</p> <p>www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/paleo-diet/art-20111182</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 and refined fats and sugars.</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.¹⁴ Fibre and calcium intake may be insufficient. Foods marketed as “paleo” can be expensive.</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 reduced.²⁰

Focus on cardiovascular as well as weight-based goals


Encourage people to focus on the range of benefits that exercise provides, rather than using body weight as the sole measure of success. Focusing on weight alone may overlook other positive changes, e.g. increased muscle mass and fitness, decreased central adiposity and better mental health.


How much physical activity is recommended?

Discussions with patients about physical activity can be guided by the following points:¹¹

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 activity to five hours per week
4. Perform muscle strengthening activities two days of each week
5. Some level of physical activity is better than none

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

 Further information about different 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. The hormone ghrelin that causes hunger may be increased for more than three years and leptin which decreases hunger is suppressed.¹³ 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. Other services and groups which can help 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 for more active people: www.parkrun.co.nz
- Community fitness classes, e.g. Zumba

Group weight loss programmes are effective

Weight loss interventions may be delivered in groups, e.g. by a practice nurse, community organisations or by a commercial provider. The advantage of this approach is that it provides a support network and allows people to share their experiences. It is unclear what the most important factors influencing the success of group programmes are, however, those that provide feedback, e.g. group weigh-ins, and dietary advice are more likely to be successful.²⁶ There is evidence that male-only group programmes are more effective than female-only programmes.²⁶

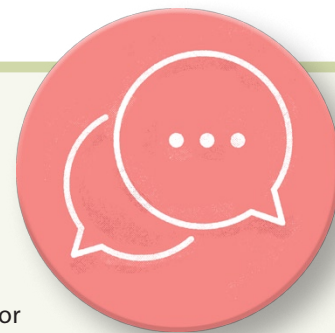
There are many commercial weight loss programmes, however, relatively few have been studied in clinical trials. The common feature of successful commercial programmes is a high level of engagement including, nutritional advice, physical activity, self-monitoring, goal setting with individual or group sessions. The two most popular programmes that are supported by evidence are Weight Watchers and Jenny Craig.²⁷ A meta-analysis found that compared to people receiving general education and counselling about weight loss, Jenny Craig was associated with 4.9% greater weight loss and Weight Watchers was associated with 2.6% greater weight loss after 12 months (limited data are available beyond this point).²⁷ The Jenny Craig programme includes meals and therefore is more expensive than Weight Watchers.²⁷

Little is known about the benefits of smart phone apps

Smart phone apps and activity tracking devices may be useful for some people to record (and potentially share) the duration and intensity of exercise or monitor dietary intake. 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 is available on long-term effectiveness.²⁸

Pharmacological interventions for weight management

There are two medicines approved for weight loss in New Zealand, both unsubsidised: phentermine and orlistat. These medicines are associated with modest weight loss which needs to be balanced against the risk of adverse effects. Some people may find the short-term use of weight-loss medicines helpful as an adjunct to lifestyle change. Current Ministry of



Discussion points for a healthy lifestyle

Encourage people to prepare meals from unprocessed ingredients and to use recipes if they lack knowledge or confidence. Include caregivers or a partner in the discussion if they are responsible for purchasing and preparing the meals.

Vegetables and fruit should be eaten most frequently, along with wholegrain and high-fibre foods and lean, skinless sources of protein with some reduced fat dairy products, oils and nuts.

Read food labels. Discuss how to identify the amount of total energy, sugar and saturated fat in food products. The Health Star Rating system helps consumers compare the overall nutritional value of similar packaged foods, e.g. the fat, sugar, fibre and protein content. The more stars a product has the higher its overall nutritional value. This system, however, is not designed to compare the nutritional value of different types of food, e.g. breakfast cereals with yoghurts.

The importance of eating complex carbohydrates. Encourage people to choose high-fibre options such as wholegrain foods, legumes, brown rice, beans, and fruit and vegetables with the skin on. Consuming 25–29 g of dietary fibre per day is associated with a 15–30% decrease in cardiovascular and all-cause mortality, coronary heart disease, stroke incidence and mortality, type 2 diabetes and colorectal cancer, compared to a low-fibre diet.²⁹ There is a strong dose-response relationship between intake of dietary fibre and whole grains and a number of these conditions.²⁹

Starchy vegetables that are traditional in many cultures are energy dense, e.g. kumara, potato, rice and taro, and should be eaten in moderation.

A vegetable garden is a cost-effective way of producing fresh vegetables that also increases activity levels. Vegetable gardens in community hubs are becoming increasingly popular.


Plain water should be the first-choice drink in preference to soft drinks and fruit juice that have a high sugar content. Free sugar* should be less than 10% of a person's total dietary energy intake and ideally less than 5%.¹¹ The addition of ice, sliced fruit or herbs, e.g. mint, can make plain water more enjoyable.

* Includes added sugar and sugars naturally present in fruit juice, syrup and honey

Reduce alcohol intake. In addition to other adverse health effects, ethanol contains almost twice as much energy per gram as protein or carbohydrates. In general, the greater the percentage of alcohol in a drink the more energy it contains, and mixers are likely to contain additional calories.

Avoid eating food late in the day as this has been associated with slower weight loss in people who are trying to lose weight and may be associated with higher levels of serum triglycerides and LDL cholesterol.³⁰

Insufficient sleep is associated with increased energy intake and weight gain.³ In addition to supporting weight loss, improving sleep quality may result in better mental health, increased alertness and improved quality of life.

 Further information on improving sleep is available from: <https://bpac.org.nz/2017/insomnia-1.aspx>

Patient resources:

The Heart Foundation has a selection of approximately 300 healthy recipes available from: www.heartfoundation.org.nz/wellbeing/healthy-recipes

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

The food pyramid has been replaced by the healthy heart visual food guide that indicates the relative quantities of food groups that should be eaten. Versions in Te Reo Māori and a number of Pacific Island and Asian languages are available from: www.healthnavigator.org.nz/healthy-living/eating-drinking/h/healthy-heart-visual-food-guide

Tools such as the Diabetes New Zealand “Take Control” app can provide recipes: www.diabetes.org.nz/take-control-toolkit/

A list of fibre-rich foods is available from: <https://nutritionfoundation.org.nz/nutrition-facts/nutrients/carbohydrates/fibre>

FoodSwitch is a smartphone app that 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

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


Advise people against using dietary supplements for weight loss as there is no evidence they are effective, they are often expensive and therefore unaffordable for some people and can be associated with serious adverse effects.

Dietary supplements include unregulated synthetic and plant products. The safety and efficacy of these products has usually not been established and there are concerns about interactions with medicines, direct toxicity and the presence of undeclared prescription medicines.^{31, 32} The U.S. Food and Drug Administration has examined dietary supplements and found hundreds that contain unsafe ingredients or compounds that have not been adequately studied, and undeclared medicines, including diuretics, antidepressants and sibutramine which was removed from the market in 2010 due to its association with cardiac dysfunction and stroke.³³

Some dietary supplements contain caffeine or capsaicinoids that may increase energy expenditure by increasing metabolism, but can also cause tachycardia, which can be particularly problematic for people with existing cardiac conditions.^{34, 35} Liver failure, colitis, rhabdomyolysis, anxiety and gastrointestinal irritation have also been reported following the use of dietary supplements.³⁴⁻³⁶

The most common herbal preparations for weight loss usually contain *Garcinia cambogia* (malabar tamarind), *Camellia sinensis* (green tea), *Hoodia gordonii* (cactus), *Citrus aurantium* (Bitter orange) or *Coleus forskohlii* (Indian coleus, similar to mint); none of which have clear evidence that they can cause long-term weight loss in humans.³⁷ A number of "slimming" teas contain senna, a naturally occurring stimulant laxative which is also a prescription medicine; excessive use may cause nausea, vomiting and diarrhoea. High-fibre tablets are also sometimes sold as appetite suppressants, although there is no evidence that these are effective for this purpose.

The bottom line is that there is no clear evidence that any alternative or complementary product can result in significant weight loss, and patients should be informed of the limitations of using these products and warned about possible adverse effects.

 Further information on ingredients often found in dietary supplements is available from: <https://ods.od.nih.gov/factsheets/WeightLoss-Consumer/>

Health advice is that medicines for weight loss should only be considered if:³


- Lifestyle changes have failed to produce clinically significant benefits after six months
- 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.³ 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.³

Phentermine has a limited role in the short-term treatment of obesity

Phentermine is a dopaminergic agonist that acts as an appetite suppressant. It is indicated as a short-term, i.e. 12 weeks or less, adjunctive treatment for weight loss in patients with a BMI greater 30 kg/m².³⁸ Phentermine is contraindicated in a number of patients, especially those with cardiac abnormalities and hypertension.³⁸ Phentermine, like amphetamine, is a sympathomimetic drug and there are some concerns that it has addictive potential (see the NZF for dosing, adverse effects and interactions with other medicines). A four-week trial is recommended when initiating phentermine and treatment beyond 12 weeks may be considered for patients who are continuing to lose weight,³⁹ however, prescribers should be alert to signs of dependence, e.g. requesting more than the maximum approved dose or lost prescriptions.

A small number of randomised controlled trials have reported a beneficial effect of phentermine on weight loss.⁴⁰

 For further information on the addictive potential of phentermine see: "Is phentermine addictive?" <https://bpac.org.nz/BPJ/2015/February/correspondence.aspx>

Orlistat reduces fat absorption and may cause gastrointestinal adverse effects

Orlistat is a selective inhibitor of pancreatic lipase that reduces the digestion and absorption of fat which is excreted in the stool. To avoid an excessive amount of fatty or oily stools patients need to adhere to a low-fat diet. Orlistat is contraindicated in patients with chronic malabsorption or cholestasis.³⁸ Orlistat should be used with caution in patients with chronic kidney disease or volume depletion.³⁸

The adverse effects of orlistat can be significant and include faecal urgency, flatulence, cramps, bloating and impaired absorption of fat-soluble vitamins, e.g. A,D,E and K.³⁸ The presence of symptoms may indicate that the patient is eating too much fat, which may motivate them to reduce their

intake.³⁸ Fewer than 10% of patients who begin treatment with orlistat continue treatment beyond one year.³ Slowly titrating the dose of orlistat or adding psyllium fibre to the diet may reduce gastrointestinal adverse effects (see the NZF for dosing, adverse effects and interactions with other medicines).²⁵

The percentage of patients taking orlistat who are able to achieve a 5% reduction in body weight after 12 months ranges from 35 – 73%.⁴¹

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

Metformin is the first-line medicine for most patients with type 2 diabetes who are obese. The main actions of metformin are to decrease gluconeogenesis and increase peripheral utilisation of glucose (see the NZF for dosing, adverse effects and interactions with other medicines).³⁸

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. It is also sometimes used as a weight loss medicine in people with a HbA_{1c} ≤ 40 mmol/mol (unapproved indication). A meta-analysis of three studies found that in people without diabetes who were overweight or obese (HbA_{1c} not reported), treatment with metformin for three to four months resulted in a 2.3 kg reduction in weight, compared to people treated with a placebo.⁴²

Surgical interventions for weight loss

Bariatric surgery is a major and generally irreversible weight loss procedure. It is effective for motivated patients who are able to maintain lifelong altered eating habits and lifestyle change.³ 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 expected.³ The Swedish Obese Subjects study found a mean reduction in body weight of 18% twenty years after bariatric surgery in a large group of patients.⁴³

Referral for bariatric surgery

The Ministry of Health's criteria for consideration of publicly funded bariatric surgery are:^{3,44}

- A BMI 35–55 kg/m², but body weight less than 160 kg, and co-morbidities, e.g. diabetes, sleep apnoea, hypertension, hypercholesterolaemia, infertility or arthritis
- Stable living arrangements and strong social supports
- No substance addiction, including nicotine; smoking cessation is required at least six weeks prior to surgery
- A willingness to accept life-long monitoring

Referrals for surgery are reviewed within each DHB by a team who apply a national scoring system to determine who will receive the greatest benefit.³ Bariatric surgery can also be accessed privately; acceptance criteria is likely to vary between clinics. A multidisciplinary team including a dietitian and a psychologist work with the primary care team to evaluate and monitor the patient before and after surgery.³ Bariatric surgeries are performed laparoscopically and the risk of complications depends on the type of surgery.

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

The long-term use of a complete mineral and multivitamin supplement is recommended containing iron, folic acid, thiamine and vitamin B12.⁴⁴ 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

Alcohol should be avoided or drunk in moderation as its metabolism may be impaired following bariatric surgery.⁴⁴ Pregnancy is not recommended for at least two years following bariatric surgery.³

Weight loss requires 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 ongoing support from family, friends and health professionals. This support is particularly important when people stumble, as they inevitably will; resilience and determination are required. The continuing 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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