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Learning objectives

After reading this article, the participant should be able to:

1. Describe how to assess and define excess weight and obesity, and identify those at greatest risk.
2. Discuss the management of obesity, including lifestyle advice, diet, physical activity and pharmacotherapy.
3. Outline the members of the multidisciplinary team and each of their roles in managing obesity.

Key words

- Diet
- Multidisciplinary team
- Obesity
- Pharmacotherapy
- Physical activity

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UNIT 3 Special care groups

Lifestyle advice and management of obesity in diabetes

Matthew Capehorn

Obesity is accompanied by an increased risk of hypertension, coronary heart disease and type 2 diabetes, and its management should be individualised and delivered by a multidisciplinary team. This module describes management options, including specialist diets, physical activity and pharmacotherapy, and the ideal multidisciplinary obesity service, with a focus on treating people with type 2 diabetes.

Obesity in adults is an important risk factor for a number of chronic conditions, including hypertension, coronary heart disease, stroke, type 2 diabetes and some cancers. Furthermore, it is directly related to increased mortality and lower life expectancy.

In May 2017, the World Obesity Federation published a Position Statement declaring that obesity is a chronic, relapsing, progressive disease process (Bray et al, 2017). This adds to the weight of opinion from other authorities, including the World Health Organization (WHO, 2000), the American Medical Association and the Canadian Medical Association, that define obesity as a disease, whether or not it is a social problem as well.

As the prevalence of obesity increases, it is expected that the associated medical problems will also increase.

Obesity prevalence

In 2015, 27% of the adult population in England were classified as obese, with a BMI >30 kg/m² (NHS Digital, 2017). In total, 58% of women and 68% of men were classified as either overweight (BMI 25–30 kg/m²) or obese. This suggests that

the majority of the population, and the people who are seen in primary care on a daily basis, are more likely to have a weight problem than be of a healthy weight. The prevalence of morbid obesity (BMI >40 kg/m²) has reached 2% of men and 4% of women, triple that observed in 1993. If current trends continue, by 2050 nine out of every 10 adults will be overweight or obese, and 50% will be classified as obese by BMI (Butland et al, 2007).

More than calories in, calories out?

Genetic factors have long been recognised to be associated with obesity. However, it is only recently that investigators have learnt how the key gene, *FTO* (fat mass and obesity-associated protein), actually works. A faulty version of *FTO* causes energy from food to be stored as fat rather than burned (Claussnitzer et al, 2015). However, the genetics of obesity should not be a distraction to effective management. A recent study concluded that genetic predisposition to obesity associated with the *FTO* minor allele can be at least partly counteracted through diet, physical activity and drugs (Livingstone et al, 2016).

For some time now, short sleep duration has been associated with gut and brain hormone

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changes associated with increasing risk of obesity (Taheri et al, 2004). Further studies since then have shown similar effects in childhood, stressing the importance of regular bedtimes and sufficient sleep duration and quality. However, more recently, there has been research showing that any “abnormal” sleep – either too much or too little – can be linked with obesity in those with a genetic predisposition (Celis-Moralis et al, 2017).

Recent developments in our knowledge of the gut microbiome and its effects on metabolism in humans have arguably raised more questions than answers (Munro, 2016). Further research into this field may provide important new strategies for the management of obesity and diabetes, but at present this is outside of the scope of this article.

Defining obesity and identifying risk

If a person expresses an interest in adopting a healthy lifestyle and losing weight, the first step should be to measure height, weight and waist circumference to establish whether he or she currently has a problem relating to weight and degree of risk.

Body mass index

The WHO (2000) has standardised the definitions of weight and obesity with its well-established classification based on BMI (*Table 1*). However, on the individual level, BMI can be inaccurate, with particularly muscular people being classified as obese when, in fact, they are healthy with no significant risk of cardiometabolic conditions. BMI measurements should, therefore, be supplemented by measurements of waist circumference.

Waist circumference

There is a strong correlation between increasing waist circumference and levels of central, or visceral, fat (as distinct from subcutaneous fat), which is deposited in and around central organs and increases cardiometabolic risk (Pischon et al, 2008). For every 5-cm increase in waist circumference, there is a 17% increased relative risk of death for men and 13% for women, independent of BMI (Pischon et al, 2008). However, analyses of prospective studies suggest that the “pear” shape may not convey any lower risk than the “apple” shape, which implies that waist

Table 1. Definition of obesity by BMI (World Health Organization, 2000).

World Health Organization classification	BMI (kg/m ²)	Risk of comorbidity
Underweight	<18.5	Low (but risk of other clinical problems increased)
Healthy weight	18.5–24.9	Average
Overweight	25.0–29.9	Mild increase
Obese	≥30.0	Moderate or higher increase
Grade 1 obesity	30.0–34.9	Moderate increase
Grade 2 obesity	35.0–39.9	Severe increase
Grade 3 (morbid) obesity	≥40.0	Very severe increase
Cut-off points for high risk in ethnic minority groups (South Asian, Chinese, black African and African-Caribbean populations; NICE, 2014)		
Overweight	23.0–24.9	Increased
Obese	≥25.0	High

circumference should supplement, but not replace, other indicators of risk (Emerging Risk Factors Collaboration, 2011; Huxley and Jacobs, 2011).

Central obesity in the Caucasian population is defined as a waist circumference of ≥94 cm in men and ≥80 cm in women (NICE, 2014). Further details on waist circumference are presented in the first version of this module (Capehorn, 2011; available at: <https://is.gd/capehorn>).

Ethnicity-specific cut-offs

The best assessment of a healthy weight in the Caucasian population is a BMI of 18.5–25.0 kg/m², and a waist circumference of ≤80 cm in women and ≤94 cm in men. As Hill (2013) has observed, however, the “evidence to give specific cut-points for BMI and waist circumference for individual ethnic minority groups is still not available.” For the time being, NICE (2013) recommends that 23 kg/m² can be applied as a BMI cut-off point for high risk in ethnic minority groups.

Consequences of obesity

Obesity in adults is an important risk factor for a number of chronic conditions, including hypertension, coronary heart disease, stroke, type 2 diabetes and some cancers (Kopelman, 2007). Furthermore, it is directly related to increased mortality and lower life expectancy (Lee et al, 1993; Adams et al, 2006).

Obesity increases the risk of developing type 2 diabetes by 12.7 times in women and by 5.2 times

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Page points

1. Previous suggestions of a protective effect of low-grade obesity have been challenged by a recent large study, in which weight history, rather than weight at a single time point, was evaluated.
2. The study showed that all people with a BMI ≥ 25 kg/m² were at increased risk of death from cardiovascular disease and certain cancers compared with people of a healthy BMI.
3. Given these findings, it is imperative to treat obesity before complications can develop. Despite this, only a small proportion of healthcare professionals discuss weight loss with their overweight patients.

in men (National Audit Office, 2001). Adipose tissue is now established as a highly metabolically active organ, and its link to the development of insulin resistance, inflammatory markers and dyslipidaemia is becoming clearer. Excess fatty acids and the adipocytokines released by adipose tissue impair the action of insulin. Visceral fat causes low-grade inflammation, with oxidative stress – in particular pancreatic beta-cell stress – leading to further insulin resistance. A cycle then develops, with further beta-cell dysfunction resulting in excess glucose production, impaired glucose uptake and utilisation and, ultimately, further insulin resistance, impairment of glucose homeostasis and the development of type 2 diabetes (Brewster, 2008). One way to break this cycle is to prevent the development of the central adiposity.

Recent fresh evidence has also linked adiposity with multiple different cancers (Kyrgiou et al, 2017). Obesity is most strongly associated with oesophageal adenocarcinoma, multiple myeloma, and cancers of the gastric cardia, colon, rectum, biliary tract system, pancreas, breast, endometrium, ovary and kidney.

An obesity paradox?

Over the years, many have questioned whether the “obesity paradox”, whereby low-grade obesity appears to be beneficial in certain people, is a real phenomenon. However, in 2017, a large study of 225 000 people was published that disputes this theory and adds more conclusive evidence that, without exception, adults who become overweight or obese have a higher risk of dying from heart disease, cancer or other illnesses (Yu et al, 2017). The authors used 16-year weight history, rather than a single baseline measurement, and observed an increased risk of death from any cause in all groups of excess weight, even those with a BMI of 25.0–29.9 kg/m².

The highest risk of death occurred in participants who had substantial decreases in weight, which most likely reflected unintentional weight loss from disease and complications (Yu et al, 2017). This may explain the J-shaped curves observed in other studies. Morbidly obese participants were twice as likely to die from any cause, more than three times as likely to die from heart disease and 50%

more likely to die from cancer when compared with normal-weight individuals.

Management of obesity

Comprehensive guidance on the prevention and management of overweight and obesity in adults and children was published by NICE in 2006. This guideline (CG43) has since been partially updated to CG189 (NICE, 2014), which adds guidance on bariatric surgery and very-low-calorie diets (VLCDs). Individuals should ideally be managed by a multidisciplinary team (MDT).

It is important to appreciate that obesity is a chronic, relapsing condition. Instead of focusing on managing the consequences of obesity, the causes should be tackled, and the person who is motivated to address any unhealthy weight issues should be appropriately managed.

Many people may feel uncomfortable about raising and discussing the issue of body weight; therefore, because it is such an important health concern, the clinician may be required to broach the subject. However, a 2015 review of 91 000 medical records where the GP had recorded excess weight found that 90% of obese patients were not documented to have been given lifestyle or dietary advice, referred to weight management services or offered anti-obesity drugs by their GP (Booth et al, 2015).

With regard to people with diabetes, the IntroDia study, which interviewed over 10 000 patients and nearly 7000 physicians regarding initial and subsequent conversations in diabetes, demonstrated that physician respondents in all of the 26 participating countries felt that good diabetes care was approximately 50% about the choice of drug and 50% about lifestyle/behaviour change (Capehorn et al, 2017). Physicians do not focus on the latter enough. In my opinion, encouraging people to make small, manageable changes to their lifestyle is likely to be more successful than attempts to radically alter their diet and physical activity.

Diet

Diets or healthy ways of eating should be tailored to the individual. To encourage adherence, clinicians should avoid dictating to people what food they should eat, and food preferences must be taken into



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Comment

Weight control: Should we support “you” or the whole population?

Rachel Pryke argues the need for both population-level and individual responses to the obesity crisis.

Available at:
<https://is.gd/ryke>

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account. For most people, avoiding unhealthy food options will improve weight loss efforts greatly.

Management should still start with looking for obvious problems, such as portion control; changing snacks to less calorie-dense options; lack of understanding of the effects of a “day off the diet”; and alcohol and high-calorie, low-fat foods. An understanding of calories is also important; this is covered in greater detail in the first version of this module (Capehorn, 2011).

A hypocaloric diet with a 500–600 kcal/day deficit below a person’s daily requirement (as predicted by the Harris–Benedict or Schofield equations [Box 1], or by the use of specialist equipment) or that reduces calories by lowering the fat content (low-fat diets) or total carbohydrate intake, in combination with support and follow-up, is recommended to promote sustainable weight loss (NICE, 2014).

A change in diet may have significant impact on the treatment regimen of a person with type 2 diabetes, especially when they are taking numerous medications (particularly oral medications or insulin regimens associated with a risk of hypoglycaemia). This will require careful consideration and perhaps an MDT approach involving the diabetes specialist nurse and the dietitian.

What is a healthy diet?

Questions continue to be raised over what macronutrients are most responsible for obesity, and indeed what constitutes a “healthy” balanced diet. There is debate among experts as to whether sugar has a greater responsibility than fat for the obesity epidemic, with sound clinical arguments on both sides (Taubes, 2013; Watts, 2013). A meta-analysis and systematic review of 72 studies (45 cohort studies and 27 controlled trials) demonstrated that, with the exception of *trans* fats, which were associated with increased coronary disease risk, there was no evidence to suggest that saturated fat increases the risk of coronary heart disease or that polyunsaturated fats have a cardioprotective effect (Chowdury et al, 2014). However, current UK guidelines with respect to fat intake remain unchanged (men should consume no more than 30 g of saturated fat per day, and women no more than 20 g per day; NHS Choices, 2017).

Clearly, further research is required to establish

the optimal macronutrient composition of a healthy, balanced diet, but it should at least be remembered that fat is calorie-dense (9 kcal/g) and that eating too much of it without curbing calorie intake from other food groups will lead to obesity.

In contrast to fat, guidelines and Government policy do seem to be changing with respect to sugar. Both the WHO (2015) and the UK Scientific Advisory Committee on Nutrition (SACN, 2015) have made policy statements aiming to reduce the intake of, specifically, “free” sugars (i.e. those that are added to food, such as table sugar and glucose), to 10% of our total daily dietary intake of calories, with SACN aiming to reduce it further to just 5% (i.e. 25 g or six teaspoons per day).

More recently, a debate has been opened regarding the role of artificial sweeteners in the management or risk of obesity and diabetes. A recent Swedish study suggested that as little as two “diet” drinks per day could double the risk of developing type 2 diabetes and latent autoimmune diabetes in adults (LADA; Löfvenborg et al, 2016), and researchers have argued that regular consumption could actually increase the likelihood of weight gain (Borges et al, 2017). However, current opinion continues to support switching to sugar-free beverages to help with the management of obesity and diabetes; indeed, a very large systematic review and meta-analysis has concluded that low-calorie sweeteners help people to reduce energy intake and can be a useful tool in weight loss (Rogers et al, 2016).

In a recent review examining the role of dietary sugar in type 2 diabetes, the authors concluded that sugar consumption can lead to type 2 diabetes, but the risk is substantially reduced when adjusted for BMI (Lean and Te Morenga, 2016). Surprisingly, in people with type 2 diabetes, there was little evidence that sugar consumption aggravates glycaemia; however, it does promote macrovascular and, to a lesser degree, microvascular complications associated with the condition.

The media has not helped by publishing conflicting evidence from different organisations and researchers recommending different diets made up from different macronutrients. Owing to the conflicting information on fats and the

Box 1. About the Harris–Benedict and Schofield equations.

The **Harris–Benedict equation** is used to estimate a person’s basal metabolic rate (BMR) and daily caloric requirements using measurements of height, weight, age, gender and physical activity. An online calculator for the equation is available at:

<http://www.bmi-calculator.net/bmr-calculator>

The Schofield equation uses the same parameters to estimate BMR. An online calculator is available at:

www.nafwa.org/schofield.html



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Article

Dietary fats in the management of diabetes

Trudi Deakin explains dietary fats and discusses the debate surrounding low-fat diets in diabetes management

Journal of Diabetes Nursing 20: 220–4

Available at:

<https://is.gd/dietaryfats>

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Page points

1. For the most part, the evidence suggests that the macronutrient composition of a diet does not make a significant difference to weight loss; rather, it is the total caloric intake that is key.
2. Very-low-calorie diets are recommended strictly as part of a multicomponent weight management strategy, and they can promote rapid and substantial weight loss.
3. Concerns that rapid weight loss inevitably leads to weight regain are being challenged, with recent evidence suggesting this is not the case.

recent trend against sugars, supporters of the low-carbohydrate diet have been promoting it as the preferred choice for weight loss (and in some cases type 2 diabetes). However, the evidence suggests that the macronutrient composition of the diet does not make a significant difference and that it is the total energy (i.e. calories) consumed that matters the most.

In 2012, a landmark systematic review and meta-analysis concluded that any changes in adiposity were mediated via changes in energy, not macronutrient composition, and the authors noted that substituting sugar with other carbohydrates of equal caloric value was not associated with weight change (Te Morenga et al, 2012). In a more recent meta-analysis, low-carbohydrate diets were compared with isoenergetic balanced diets for reducing weight and cardiovascular risk, and the conclusion very strongly showed that weight loss was unrelated to the macronutrient composition and was mostly only short-term, with little or no difference in weight loss or cardiovascular risk up to 2 years later (Naude et al, 2014).

With increasing evidence that weight management relates mostly to energy intake, starchy foods and other carbohydrates need to be considered in the same way as refined and other sugars. However, it is important to note that, while refined sugars are considered to have no nutritional value, starchy foods and other carbohydrates still form part of the dietary “Eatwell” Guidelines (Public Health England, 2016).

Very-low-calorie diets

The use of very-low-calorie diets (VLCDs; also known as very-low-energy diets [VLEDs]), which comprise a caloric intake of 450–800 kcal/day, is supported by the National Obesity Forum (NOF, 2010) and NICE (2014), strictly as part of a multicomponent weight management strategy, for patients who are obese and who have a clinically assessed need to rapidly lose weight. The short-term use of a VLCD rapidly improves glycaemic control and promotes substantial weight loss in obese people with type 2 diabetes (Capstick et al, 1997).

There is an ongoing study, funded by Diabetes UK, titled DiRECT (Diabetes Remission Clinical Trial), which is examining the role of VLCDs in weight loss and their

potential for diabetes remission (Leslie et al, 2016). Although the trial is not yet complete, looking at the provisional data, the investigators expect diabetes remission rates of 30–50% within the region of 15% weight loss, without the use of weight-loss medication.

The advantages of VLCDs include the rapid and significant weight loss which, if the VLCD is adhered to, results in weight loss comparable to that with bariatric surgery, without being invasive and without any subjective hunger once the patient becomes ketotic.

Recent research has outlined the benefits of rapid weight loss over the traditional “slow and steady” approach, as the rate of weight loss does not appear to affect the proportion of weight regained (Purcell et al, 2014; Rolland et al, 2014). This suggests the health benefits associated with weight loss can be achieved more quickly, and potentially for longer, with more rapid weight loss. In practice, there is still a common belief that a high rate of weight loss is not advantageous and will lead inevitably to weight regain, but this view is slowly being challenged (Johanssen et al, 2014; Christensen et al, 2017).

Meal replacements and total food replacement programmes represent alternative dieting options, and these are covered in the first version of this module (Capehorn, 2011). In my opinion, use of specific diets such as VLCDs will be more effective with full MDT support, and we may see use of this type of diet increasing over the next few years.

Physical activity

Although physical activity has proven cardiovascular health benefits and a role in maintaining weight loss, it is generally considered to be a less efficient intervention for actual weight loss than reducing caloric intake. The maxim that “you cannot outrun a bad diet” demonstrates this point (Malhotra et al, 2015). However, it is crucial to the maintenance of weight loss (Hill et al, 2005).

The WHO (2017) has updated its advice regarding physical activity, recommending that adults have at least 150 minutes of moderate-intensity activity per week. It stated that physically inactive people have a 20–30% increased risk of death compared with active people.

The current Government recommendation

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in England is for a minimum of 30 minutes of moderate-intensity physical activity on at least 5 days per week for general health; however, for weight loss or maintenance of reduced weight, physical activity should be increased to 60–90 minutes on at least 5 days per week (NICE, 2014). The level and type of physical activity will depend on what is achievable for the individual and should focus on what is acceptable within his or her normal lifestyle in order to improve adherence.

Being aware of the obesogenic environment in which we live may also be beneficial. Encouraging individuals to take the stairs instead of a lift or escalator, and parking further away from the entrance to the supermarket, for example, can be as beneficial as planned physical activity. More walking should be encouraged, especially for the short distances normally travelled by car, as should reducing sedentary behaviour such as watching television.

A meta-analysis performed in 2001 showed that exercise training reduces HbA_{1c} levels by sufficient amounts to reduce the risk of diabetes complications, although the precise metabolic changes and effects attributable to the exercise are still not yet fully understood (Boulé et al, 2001). However, no significant difference in body mass was found when exercise groups were compared with control groups, and there was insufficient evidence to define any dose–response effect of acute exercise on glucose metabolism.

Behavioural therapy and “talking therapies”

Behavioural therapy strategies have varying levels of adherence and effectiveness, but include recording diet and exercise patterns in a diary, identifying and avoiding high-risk situations (such as having high-calorie foods in the house, or eating mid-morning snacks with work colleagues when not really hungry), and changing unrealistic goals and false beliefs about weight loss and body image to realistic and positive ones. When used in combination with other weight-loss approaches, behavioural therapy provides additional benefits in assisting people in losing weight (Shaw et al, 2005).

The collective term “talking therapies” includes life-coaching, cognitive behavioural therapy, neurolinguistic programming, emotional freedom

techniques and hypnotherapy. Although there is not yet convincing evidence that these techniques offer equivalent effectiveness to that of other interventions (high-quality randomised controlled trials will be required to assess their true role), there is no doubt that some people with diabetes prefer these approaches, and treatment should be tailored to the individual.

Eating can be a strategy for coping with emotional distress (Nash, 2014) and such individuals need to be taught strategies for tackling their emotions, without using food for non-hunger-related reasons. Many people with severe and complex obesity who hope to undergo bariatric surgery have emotional eating issues and, unless addressed, their outcome is likely to be less successful (National Confidential Enquiry into Patient Outcome and Death, 2012). This is why the NHS Commissioning Board (2013) guidelines for bariatric surgery focus heavily on the need to include psychological assessments and support in all bariatric surgery candidates.

Pharmacotherapy

Pharmacotherapy should be considered as part of a comprehensive strategy of obesity management. There are now three licensed weight-loss medications in the UK. The most established is orlistat, a gastrointestinal lipase inhibitor that prevents absorption of around 30% of dietary fat. It is taken orally with meals and should be prescribed only as part of an overall plan for managing obesity in adults with a BMI ≥ 28.0 kg/m² with associated risk factors, or a BMI of ≥ 30.0 kg/m² (electronic Medicines Compendium, 2013). Factors related to prescribing orlistat are described in more detail in the first version of this module (Capehorn, 2011).

More recently, in 2017, two other medications were approved for obesity. Both can be considered as appetite suppressants. Saxenda® (liraglutide 3.0 mg) is a glucagon-like peptide-1 (GLP-1) receptor agonist that has been prescribed for the management of type 2 diabetes at doses of 1.2 mg or 1.8 mg. Weight loss is achieved mainly through inhibition of gastric emptying and through effects on the central nervous system that result in decreased calorie ingestion, as well as reducing acid secretion (Van Gaal and Scheen, 2015).

Page points

1. Physical activity has proven health benefits and an important role to play in weight maintenance; however, it is less effective than calorie restriction for weight loss.
2. The Government recommends ≥ 30 minutes of moderate physical activity on at least 5 days per week, increasing to 60–90 minutes per day in people seeking to lose weight or maintain reduced weight.
3. When used in combination with other weight-loss approaches, behavioural and talking therapies provide additional benefits in assisting people to lose weight.
4. There are now three weight-loss medications licensed in the UK: orlistat, liraglutide, and combined naltrexone and bupropion. However, only orlistat is recommended for routine NHS use at present.



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Comment series

Non-hunger eating: How to tackle it in time-limited consultations using the Eating Blueprint approach

Jen Nash introduces a series of tips and strategies to address emotional eating.

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Table 2. Effectiveness of weight loss medications (Khera et al, 2016).

Weight loss drug	Median percentage achieving 5% weight loss	Average weight loss (vs placebo)
Phentermine/topiramate	75%	8.8 kg
Liraglutide 3.0 mg	63%	5.3 kg
Naltrexone/bupropion	55%	5.0 kg
Lorcaserin	49%	3.2 kg
Orlistat	44%	2.6 kg
Placebo	23%	reference

Mysimba® (a combination of sustained-release naltrexone and bupropion) increases levels of dopamine and pro-opiomelanocortin neuronal activity. Weight loss is achieved by suppressing appetite due to increased secretion of melanocortins, which mediate anorectic effects and regulate energy balance (Van Gaal and Scheen, 2015).

In August 2017, NICE rejected Mysimba for routine NHS use. No decision has yet been made on Saxenda.

A systematic review and meta-analysis of available weight-loss drugs in the US (including a phentermine/topiramate combination and lorcaserin, which are currently not available in the UK) demonstrated the effectiveness of the newer weight-loss medications (Khera et al, 2016). The results are summarised in *Table 2*. Compared with placebo, liraglutide and naltrexone/bupropion had the highest risk of treatment discontinuation related to adverse events. Other drug classes and combinations are in development for potential use in the future (Van Gaal and Scheen, 2015), but these are currently beyond of the scope of this article.

The efficacy of weight-loss pharmacotherapy should be evaluated after the first 3 months. In the case of Saxenda and Mysimba, this is recommended to be 3 months after reaching the full treatment dose (i.e. 3 months after a 4-week uptitration from the starting dose, which helps to avoid side effects). NICE (2014) suggests that the adult target for weight loss should be 5–10% of the original weight; however, obesity consensus guidelines conclude that a target loss of 5% is appropriate, although individualised targets may well be less (Barnett et al, 2009).

Diabetes treatment and weight

Many antidiabetes medications are associated with weight gain. Even drugs that are not directly associated with weight gain may indirectly contribute if they result in excess circulating insulin levels, as insulin promotes adipogenesis and weight gain (Kahn et al, 2006). NICE (2014) recommends metformin as first-line treatment for people with type 2 diabetes, providing there are no contraindications to its use, and studies have shown metformin to be weight-neutral (Nathan et al, 2009). However, sulfonylureas, thiazolidinediones, meglitinides and insulin have all been shown to promote weight gain.

There are newer classes of diabetes medications that are more weight-friendly and, although not licensed for weight loss, their use should be considered if weight is an issue. Dipeptidyl peptidase-4 inhibitors are weight-neutral, while GLP-1 receptor agonists and sodium–glucose cotransporter 2 inhibitors promote weight loss (Nathan et al, 2009; Munro et al, 2013; NICE, 2014).

The updated NICE guidelines on the management of type 2 diabetes in adults (NG28) allowed more flexibility to prescribe appropriate weight-friendly antidiabetes agents within the care pathway for people with diabetes who are also overweight or obese (NICE, 2015).

Bariatric surgery

Bariatric surgery is a cost-effective clinical option for appropriate obese patients who have been properly managed and assessed for clinical and psychological barriers to effective weight loss (Picot et al, 2009). The success will be dependent on appropriate pre- and postoperative counselling provided within an MDT.

Roux-en-Y gastric bypass and sleeve gastrectomy require lifelong supplementation and monitoring postoperatively. This currently takes place in specialist services for the first 2 years and thereafter in primary care. Detailed information on referral and pre- and postoperative management is provided in an accompanying article in this Journal (Zalin et al, 2017; see page 166).

Weight regain

Any change in diet that results in lower calorie



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Article

Is a local Tier 3 weight management service effective in supporting people with type 2 diabetes to lose weight?

Iona Taylor investigates whether Tier 3 services are able to provide effective support for people with obesity and, specifically, type 2 diabetes.

Diabetes in Practice 4: 152–6

Available at:

<https://is.gd/tier3>

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consumption, whether due to reduced portion size or consuming foods that are less calorie-dense, will result in weight loss. However, it is common for weight loss to plateau, for several reasons. Ultimately, as weight decreases, so do energy requirements, and eventually calorie intake (at levels that were previously at a deficit) may become equal to energy requirements. Furthermore, an individual may drift back into bad habits and fall foul of the obesogenic environment. Where weight loss does not plateau, the diet will need to be adjusted again, once a healthy weight has been achieved, in favour of one that is nutritionally balanced and sustainable in the long term, with ability to make rapid adjustments if weight regain occurs.

Weight regain is complex and appears to be part of a homeostatic adaptation involving many different hormones. Even after a significant period of time following weight reduction, levels of these circulating mediators of appetite that encourage weight regain stay higher than before weight loss (Sumithran et al, 2011). Clearly, new therapies to tackle this hormonal regulation of body weight will be required to counteract this change if we hope to prevent relapse of obesity.

An MDT approach to weight management

NOF (2007) recommends that best-practice specialist weight management interventions be based on an MDT approach. This specialist tier of intervention for adults and children with weight problems should comprise a team of specialists that can deliver different approaches to weight loss. This will ideally include dedicated obesity specialist nurses (OSNs), healthcare assistants (HCAs), dietitian input for complex dietary needs, “Cook & Eat” programmes for cooking skills education, talking therapies providing psychological input and support, exercise therapists who can provide personalised training programmes, and a GP with a special interest in obesity for any medication issues. There should also be facilities for group work in relation to exercise, talking therapies and nutritional advice.

The specialist MDT service could also provide the triage and assessment for all people being considered for further interventions, which

may include bariatric surgery in adults or the attendance at residential weight management camps for children.

As with all consultations, a good history and examination is vital. All people should initially have measurements of blood pressure, weight, height, BMI, waist circumference and, where possible, fat composition using bio-impedance scales. The use of bio-impedance measurements helps to dispel some of the myths that people have that they are “big-boned”, that it is “all muscle”, or “just fluid”. Furthermore, as individuals increase their level of physical activity and hopefully increase their lean muscle mass, bio-impedance measurements can demonstrate that, even in the absence of any actual overall weight loss, visceral fat may be decreasing and being replaced by muscle, which is more dense. However, an effective weight management clinic can be run with just a height measure, some accurate scales and a tape measure.

If no recent blood tests have been performed, these should be taken to exclude previously undiagnosed metabolic conditions, such as diabetes and non-diabetic hyperglycaemia, underactive thyroid or other associated risk factors. Standard blood tests in nearly all individuals should include fasting plasma glucose or HbA_{1c} level, thyroid function tests, liver function tests and lipid profile.

In addition, it should be the role of the Tier 3 specialist MDT to assess the individual for comorbidities such as obstructive sleep apnoea, with both questionnaire-based screening and overnight oximetry testing. Those shown to have a high apnoea–hypopnoea index should be referred to a local specialist sleep centre for consideration of an appropriate treatment (e.g. continuous positive airway pressure), in conjunction with ongoing weight management.

Individuals should be triaged by an OSN to assess which, if not all, of the services offered by the MDT are required, and appointments made as appropriate.

All individuals should receive further basic dietary and nutritional advice as well as lifestyle and exercise education throughout the length of time they are in the weight management service. The basic nutritional information may be delivered by the OSN, appropriately qualified HCAs

Page points

1. Best-practice specialist weight management interventions should be based on an multidisciplinary team approach, with input from obesity specialist nurses, healthcare assistants, dietitians, talking therapists, exercise therapists and a GP with a special interest in obesity.
2. All patients should receive further basic dietary and nutritional advice as well as lifestyle and exercise education throughout the length of time they are in the weight management service. When appropriate, more intensive input and education should be offered by other members of the team.



Read more
online

Article

Lifestyle advice and management of obesity in diabetes

The **first version** of this article, which goes into greater detail about waist circumference, calories, food replacement programmes, orlistat and the multidisciplinary team.

Diabetes & Primary Care **13**: 162–72

Available at:
<https://is.gd/capehorn>

Supported by an educational grant from Janssen, part of the Johnson & Johnson Family of Diabetes Companies. These modules were conceived and are delivered by the Primary Care Diabetes Society in association with Diabetes & Primary Care. The sponsor had no input into the module and is not responsible for its content.

Box 2. Case report.

Mr S (now aged 63 years) led an unhealthy and sedentary life as a taxi driver. He had been diagnosed with type 2 diabetes, had high blood pressure and was the main carer for his wife. He first attended the Rotherham Institute for Obesity (RIO) in 2010, when his measurements included: height, 179 cm; weight, 126.8 kg; BMI, 39.6 kg/m²; waist circumference, 139 cm; total fat, 36.6%; muscle mass, 76.5 kg; blood pressure, 136/84 mmHg on medication (medications included metformin, gliclazide, candesartan, simvastatin, lansoprazole, sennosides and as-needed analgesics); and HbA_{1c}, 46 mmol/mol (6.4%). He fully engaged with the RIO multidisciplinary team, accessing the health trainer, nursing team, on-site gym and “Cook & Eat” team.

Follow-up measurements taken in June 2012 were: weight, 88.9 kg; BMI, 27.7 kg/m²; waist circumference, 106 cm; total fat, 18.7%; muscle mass, 68.5 kg; weight loss, 37.9 kg (29.9% of baseline weight loss and 81.2% of excess weight lost); blood pressure, 118/68 mmHg off anti-hypertensives (medications now metformin and simvastatin); last recorded HbA_{1c}, 32 mmol/mol (5.1%). He still attends the gym, is still losing weight and, subjectively, feels much healthier. His weight loss has resulted in his blood pressure being much better controlled, and he has reduced his diabetes medications.

Mr S said: “Being overweight had affected my self-confidence and left me feeling very self-conscious. It also meant that I bought very few clothes as I struggled to find shops that carried sizes big enough, not to mention that larger clothes were much more expensive. I am now fitter, more confident and healthier; I’m a different person – my blood pressure is also on the way down.”

or, where available, the facilitators in cooking skills sessions. It may not be effective to deliver nutritional information if the person does not know how to implement it owing to an inability to cook from natural raw ingredients.

Individuals should be invited to see any or all appropriate members of the MDT as often as they need to. However, they should only be weighed and measured every 4 weeks, to overcome the effect of hormonal fluid retention that can occur, and the confusing effect that this can have on monitoring weight.

It is important to consider weight as a modifiable risk factor for disease. If the health of a person is to be improved, weight loss needs to concentrate on visceral fat loss rather than chasing the numbers on scales that only reflect overall weight. Having looser-fitting clothing may be a better indication of successful weight loss than changes on the scales.

It is also important that, when appropriate, more intensive input and education is offered from other members of the MDT. This is described in the first version of this module (Capehorn, 2011).

Hughes (2015) discusses the challenges and rewards of setting up a Tier 3 weight management service. A case example of results achieved under the care of a MDT are described in Box 2.

Conclusion

Obese people unable to achieve significant weight loss by themselves should be offered a range of help within a specialist service. Obesity should be treated as a chronic, relapsing disease, and prevention of weight regain must be part of all obesity treatment programmes. The obesity epidemic needs to be tackled by provision of sufficient resources and by sharing best practice to develop local, regional and national strategies that can reverse current trends.

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Online CPD activity

Visit www.diabetesonthenet.com/cpd to record your answers and gain a certificate of participation

Participants should read the preceding article before answering the multiple choice questions below. After submitting your answers online, you will be immediately notified of your score. A pass mark of 70% is required to obtain a certificate of successful participation; however, it is possible to take the test a maximum of three times. A short explanation of the correct answer is provided. Before accessing your certificate, you will be given the opportunity to evaluate the activity and reflect on the module, stating how you will use what you have learnt in practice. The CPD centre keeps a record of your CPD activities and provides the option to add items to an action plan, which will help you to collate evidence for your annual appraisal.

- According to 2015 data (NHS Digital, 2017), what approximate percentage of men in England have a BMI of **25 kg/m² or more**?
Select **ONE** option only.
 - 40
 - 50
 - 60
 - 70
 - 80
- When faulty, which **ONE** of the following genes is **MOST** strongly associated with obesity (through energy from food being stored as fat rather than burned)?
Select **ONE** option only.
 - ADCY9
 - FTO
 - RPTOR
 - ZZZ3
 - MC4R
- A 39-year-old Caucasian woman has type 2 diabetes and a BMI of 34 kg/m². According to **World Health Organization** criteria, which **ONE** of the following definitions matches her BMI?
Select **ONE** option only.
 - Overweight
 - Grade 1 obesity
 - Grade 2 obesity
 - Grade 3 obesity
 - Morbidly obese
- A 25-year-old, male, Caucasian, athletic rugby player has a BMI of 28 kg/m². What is the **THRESHOLD** waist circumference (cm), if any, **BELOW** which he can be regarded as having a healthy weight?
 - Ketogenic
 - Low-carbohydrate
 - Low-fat
 - Low-sugar
 - No single diet recommended
- According to 2015 data, what percentage of obese people attending a GP were given any of the following: lifestyle or dietary advice, referral to a weight loss service or offering of weight loss medication?
Select **ONE** option only.
 - 10
 - 20
 - 50
 - 70
 - 90
- Which **TWO** of the following cancers are **MOST** strongly associated with obesity?
Select **TWO** options.
 - Colon
 - Liver
 - Lung
 - Ovary
 - Testes
 - Tongue
- A 46-year-old obese woman has increased her daily physical activity but has failed to lose any weight. According to current evidence, which is the **MOST** appropriate weight loss diet, if any, to recommend?
Select **ONE** option only.
 - Ketogenic
 - Low-carbohydrate
 - Low-fat
 - Low-sugar
 - No single diet recommended
- A 49-year-old obese man has hypertension, prediabetes and hyperlipidaemia. He is regularly exercising and concordant with dietary advice but has not lost weight. According to NICE guidance, which is the **MOST** appropriate weight loss medication to prescribe? Select **ONE** option only.
 - Bupropion
 - Liraglutide
 - Metformin
 - Orlistat
 - Phentermine
- A 61-year-old woman has type 2 diabetes and a BMI of 35 kg/m². Her last three HbA_{1c} results were consistently 60–62 mmol/mol (7.6–7.8%). She takes twice-daily glipizide and metformin. The addition of which antidiabetes agent class is **MOST LIKELY** to promote weight loss? Select **ONE** option only.
 - Alpha-glucosidase inhibitor
 - SGLT2 inhibitor
 - Thiazolidinedione
 - Meglitinide
 - DPP-4 inhibitor
- A 44-year-old man has a BMI of 47 kg/m². He is otherwise well and is referred for Tier 3 weight loss management. His screening blood tests show a normal blood glucose, HbA_{1c}, thyroid function and lipid profile. Which is the **MOST** appropriate **ADDITIONAL** screening blood test?
Select **ONE** option only.
 - Cortisol
 - Erythrocyte sedimentation rate
 - Full blood count
 - Liver function tests
 - Urea and electrolytes