



Online learning opportunity

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Article points

1. Some anti-diabetes medications may cause weight gain, so it is important to warn people with diabetes before the start of treatment.
2. Weight loss will lead to improvement and potential remission of type 2 diabetes. Loss of 5–10% total body weight significantly improves cardiometabolic risk factors.
3. Intensive lifestyle interventions, with or without the use of orlistat, result in modest weight loss.
4. Currently, bariatric surgery is the most effective treatment for type 2 diabetes for people with extreme obesity.

Key words

- Bariatric surgery
- Diabetes
- Weight management

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Tackling diabetes: Weight management issues for people with type 2 diabetes

Wen Bun Leong, Shahrads Taheri

The World Health Organization has estimated that more than 1.4 billion adults worldwide are now classified as obese, which is defined as a body mass index of ≥ 30 kg/m². The rising prevalence of obesity has led to a simultaneous increase in the prevalence of type 2 diabetes, and the term “diabesity” has been coined to describe those with type 2 diabetes and obesity. The aim of this review is to describe the prevalence of obesity and type 2 diabetes in the UK and summarise practical aspects of weight management. It will also explore the role of healthcare professionals in weight management and the prevention of the complications of diabesity.

Obesity results from a chronic surplus of energy intake combined with inadequate energy expenditure. It is defined as having a body mass index (BMI) of ≥ 30 kg/m² (≥ 27.5 kg/m² for South Asians). The prevalence of obesity is on the rise globally; the World Health Organization has estimated that more than 1.4 billion adults worldwide are now classified as obese (WHO, 2013). In the UK, at least 24% of adult men and 25% of adult women are obese (Health and Social Care Information Centre, 2013). Of those adults who are obese, at least 3.5% of women and 1.5% of men are severely obese (defined as having a BMI of 40 kg/m² and above; Health and Social Care Information Centre, 2013). It has been projected that in 2030 there will be an additional 11 million obese adults in the UK (Wang et al, 2011) and the Foresight report has estimated that more than half of the UK population will be obese by 2050 (Butland et al, 2007). The report also projected that, if no preventive measures are in place, the total economic cost of obesity and people being overweight will be £50 billion per year in 2050 (Butland et al, 2007).

Obese individuals have a higher risk of developing metabolic abnormalities, such as type 2 diabetes,

dyslipidaemia, non-alcoholic fatty liver disease, hypertension, and obstructive sleep apnoea. Unsurprisingly, life expectancy is lower in people with obesity compared with those with a normal BMI of 18.5–24.9 kg/m² (Peeters et al, 2003). Obese individuals are also more likely to miss work due to sickness, have disabilities, such as immobility (secondary to osteoarthritis), and have reduced quality of life.

As obesity is a major risk factor for the development of type 2 diabetes, the rising trend in obesity has led to a simultaneous increase in the prevalence of type 2 diabetes. Currently, the estimated diabetes prevalence worldwide is 366 million and this is projected to rise to 552 million by 2030 (Diabetes UK, 2012). In the UK, at least 2.9 million people have been diagnosed with diabetes and an additional 850 000 people have the condition but remain undiagnosed (Diabetes UK, 2012). The overall UK prevalence for diabetes is 4.5%, but it is much higher in areas with high levels of obesity. In 2025, the number of individuals with diabetes is expected to rise to 5 million (Diabetes UK, 2012). The parallel increase of obesity and type 2 diabetes has led to the development of the term “diabesity” to describe people with both conditions.

Weight management in diabetes

The majority of people with type 2 diabetes are overweight or obese. Several studies have shown the importance of lifestyle change and weight loss for the prevention of type 2 diabetes in individuals who are at-risk of developing the disease (Thomas et al, 2010). Weight reduction improves diabetes and reduces cardiovascular risk.

Pharmacological agents used for the treatment of obesity itself have had a chequered history with many being withdrawn because of serious side effects (most recently, rimonobant and sibutramine) and concerns regarding safety (Samat et al, 2008). There is currently only one approved drug available in the UK – orlistat. Thus, emphasis should be on lifestyle change, appropriate selection of drugs used in diabetes treatment, and bariatric surgery for those with severe obesity. *Box 1* describes the steps health professionals should take when assessing a person with obesity. It is important to gauge the individual's readiness for change and also to help to maintain momentum in motivated people. Informing obese people that weight loss can reduce pill or injection burden and also has the potential to create remission of their diabetes should be a big motivating force to lose weight.

Mental health issues

Depression is common among people with obesity, as well as those with type 2 diabetes, and this can affect motivation to lose weight. At the authors' clinical practice there is a routine assessment for anxiety and depression in people with diabetes. Our service audits and evaluations have highlighted that both depression (66%) and anxiety (70%) are very common in severely obese individuals, compared to the UK's general

population, where the levels are 33% for anxiety and 11.4% for depression (Jagielski et al, 2014). An issue with using screening tools for anxiety and depression is that they have not been specifically evaluated in individuals with severe obesity or obesity complicated by diabetes. Nevertheless, there is a need to identify mood disorders as they will hinder the individual addressing issues with their obesity and diabetes. Some individuals may require medication for depression depending on severity and it should be remembered that many anti-depressants cause weight gain.

In some cases, an eating disorder might be present. These include binge eating or night-eating syndrome. Binge eating is defined as consumption of a large amount of food in a short period of time due to subjective loss of control (Snyder, 2009). Night eating is characterised by eating a significant portion of daily calories after the main meal in the evening (Allison et al, 2006). Both conditions are more common in women. Individuals with these conditions should be referred for psychological support and management.

Obesity is a chronic disorder; drastic lifestyle change is unlikely to result in maintained long-term weight loss, given the body's fierce biological drive to retain body weight. It is important for individuals to be advised to make small sustainable changes that are likely to be maintained. It is generally recommended that people should aim to lose 0.5–1 kg per week (National Heart Lung Blood Institute, National Institute of Diabetes Digestive Kidney Diseases, 1998; Scottish Intercollegiate Guidelines Network [SIGN], 2010).

There are several dietary interventions available to help achieve weight loss goals, including the 600 Calorie deficit diet, low energy (LED) and very low energy diets (VLED), carbohydrate restriction diet, low glycaemic index diet, Mediterranean diet and low fat diet (Leong and Taheri, 2012). A study has reported remission of type 2 diabetes after 8 weeks of a very low energy diet but whether this can be maintained long term is unclear (Lim et al, 2011). It is important to tailor the dietary approach to the individual. While VLEDs are much safer than before, NICE recommends their use for a maximum of 12 weeks (NICE, 2006). Emerging data show that LEDs are just as effective as VLEDs and are better tolerated (Riecke et al, 2010). There needs to be close supervision of people with type 2 diabetes who embark on these diets to ensure they have support and they

Box 1. General assessment of a person with obesity.

- Weight history (onset of obesity, family history).
- Dieting history (positive/negative aspects from previous weight loss attempts).
- Eating patterns (skipping meals, snack intake, binge eating, fast-food intake).
- Dietary intake (food diary, usually assessed by a dietitian).
- Physical activity (use of pedometer, levels of sedentary behaviour).
- Alcohol intake.
- Smoking history.
- Psychological issues (depression, eating disorders).
- Individual's expectation (realistic or unrealistic).
- Individual's motivation (willingness and ability to change).
- Social circumstances and emotional support.

are safe by, for example, avoiding hypoglycaemia in insulin-treated individuals.

Intensive lifestyle intervention is useful for weight loss and diabetes control in people with type 2 diabetes. The Look AHEAD study showed that a 5% reduction of total initial body weight resulted in significant reduction in cardiovascular risk factors (Look and Wing, 2010). The treatment programme is well structured with regular weekly or fortnightly follow-up for the first 3–6 months. Group sessions are more cost effective and are shown to provide better initial weight reduction as they offer greater support and healthy competition between members.

Currently, the only anti-obesity medication available is the pancreatic lipase inhibitor, orlistat, which works by inhibiting absorption of fat in the

intestine. It is recommended by NICE (2006) to be used as an adjunct to other weight management interventions, and the drug should be prescribed only with accompanying lifestyle advice and support. Use of orlistat beyond 12 months is mainly for weight maintenance as many people regain weight they have lost after the treatment is discontinued (Torgerson et al, 2004). In rare cases, orlistat can result in deficiency of fat-soluble vitamins, particularly vitamin D, which is normally found in low levels in people with obesity and diabetes (Compher et al, 2008).

Glycaemic control and reduction in hypertension and dyslipidaemia are the cornerstones of diabetes care, with best results obtained for blood pressure and cholesterol reduction. Unfortunately, the emphasis on these factors has somewhat detracted from lifestyle change and weight loss, and the focus on glycaemic control has paradoxically resulted in weight gain. Weight gain further exacerbates glycaemic control resulting in further treatment intensification, thus creating a vicious cycle. A summary of diabetes medications and their effects on weight and other side effects are shown in *Table 1*. These factors should be considered when deciding diabetes management strategies for people with obesity.

Table 1. Summary of currently available diabetes treatments and their effects on HbA_{1c}, body weight and their adverse side effects (Nathan et al, 2009; Inzucchi et al, 2012; Munro et al, 2013).

Diabetes treatment	General effects on body weight	Adverse side effects
Biguanides	No weight gain	Gastrointestinal side effects; very rare cases of lactic acidosis
Sulphonylureas	Weight gain	Hypoglycaemia
α-Glucosidase inhibitors	Weight neutral	Gastrointestinal side effects
Glucagon-like peptide-1 analogue	Weight loss	Nausea, vomiting, pancreatitis
Pramlintide	Weight loss	Gastrointestinal side effects
Glinides	Weight gain	Gastrointestinal side effects
Insulin	Weight gain	Hypoglycaemia
Thiazolidinediones	Weight gain	Fluid retention, heart failure
Dipeptidyl peptidase-4 (DPP-4) inhibitor	Weight neutral	Upper respiratory tract infection, nasopharyngitis, headache
Sodium–glucose cotransporter 2 (SGLT-2) inhibitors	Weight loss	Urinary tract and genital infection

Role of healthcare professionals

During a consultation with a person who has type 2 diabetes and obesity, healthcare professionals should use their often limited time to cover the areas summarised below:

- Medication review: It is essential to exclude unnecessary medications and alter those that may cause weight gain. An individualised approach to diabetes medication means choosing drugs that are either weight neutral or that can promote weight loss in people with diabetes. *Box 2* shows a list of common drugs that may induce weight gain (Leong and Taheri, 2012).
- Smoking cessation: This is important as part of cardiovascular and cancer risk assessment. The Framingham Heart Study has reported that a 40-year-old obese smoker can lose 13 years in life expectancy compared with a normal-weight non-smoking counterpart (Peeters et al, 2003); therefore, smoking cessation advice is extremely important. Unfortunately, the process of smoking cessation may lead to higher food consumption and alteration of the body’s metabolism, which may result in

Page points

1. Cutting down on alcohol intake is very beneficial as some alcoholic drinks are high in calories and can cause weight gain. Some individuals can lose a significant amount of weight after cutting down on alcohol.
2. When eating disorders, such as comfort eating, emotional eating, binge eating and night-time eating are suspected, appropriate dietary and/or psychological assessment is required.
3. Currently, bariatric surgery is the most effective treatment available for weight reduction for people with type 2 diabetes and extreme obesity.

weight gain (Williamson et al, 1991; Chiolero et al, 2008). Nicotine replacement or chewing gum may help to prevent snacking. Bupropion, a smoking cessation drug, could be considered as it has been shown to result in weight loss. Appropriate preparation for the individual's quit date, and beyond, should help avoid excessive weight gain.

- Alcohol and carbonated drinks: Cutting down on alcohol intake is very beneficial as some alcoholic drinks are high in calories and can cause weight gain. Some individuals can lose a significant amount of weight after cutting down on alcohol. Carbonated drink intake is a particularly common issue for people with obesity and diabetes so they should be encouraged to switch to water.
- Advice and goal setting: Several studies have found a discrepancy in the expectation of successful weight loss between patients and healthcare professionals (Foster et al, 2001; Wee et al, 2006). It is necessary to set achievable targets at initial assessment to prevent unrealistic expectations or negative emotions and attitudes. The recommended goal is 0.5–1 kg or 1–2 lb weight reduction per week (SIGN, 2010) and losing 5–10% of body weight in 6 months. This could be achieved by reducing portion sizes, avoiding second helpings, cutting down on alcohol and a carbohydrate restriction diet.
- Eating disorders: When eating disorders, such as comfort eating, emotional eating, binge eating and night-time eating are suspected, appropriate dietary and/or psychological assessment is required.
- Orlistat: Studies have shown modest weight reduction (5 kg) with most weight loss occurring in the first 6 months of treatment with orlistat in conjunction with lifestyle changes (Wadden et al, 2011). NICE has recommended that orlistat should be used in addition to lifestyle intervention (NICE, 2006). Orlistat can be used for more than 12 months for weight maintenance as long-term weight regain occurs frequently.
- Additional issues: Identifying additional issues that may impinge on body weight and diabetes, such as obstructive sleep apnoea (OSA), is essential when addressing the individual's cardiometabolic risk and addressing these issues would help to improve quality of life.

When individuals experience difficulties with losing even the minimum amount of weight, which is common in people with type 2 diabetes, a holistic

Box 2. Common drugs that promote weight gain (Leong and Taheri, 2012).

- Anti-diabetes medications (insulin, sulphonylurea, thiazolidinedione, glinides)
- Anti-hypertensives (beta-blockers, calcium-channel blockers)
- Diabetic neuropathy treatment (amitriptyline, gabapentin)
- Anti-depressants (tricyclic anti-depressants, some serotonin-specific reuptake inhibitors, mirtazapine)
- Corticosteroids
- Antihistamines
- Anti-psychotics (clozapine, olanzapine, risperidone, quetiapine)
- Mood stabilisers (lithium)
- Anti-neoplastic agents (tamoxifen)

review is necessary. There might be underlying psychological issues, such as eating disorders or previous experience of abuse, social factors, such as marital discordance, or healthcare issues, such as disabilities, causing problems with physical activity.

Bariatric surgery

Currently, bariatric surgery is the most effective treatment available for weight reduction for people with type 2 diabetes and extreme obesity. NICE (2006) and the International Diabetes Federation (IDF; Dixon et al, 2011) have recommended the use of bariatric surgery in this population. Bariatric surgery is recommended for people with type 2 diabetes with a BMI ≥ 35 kg/m². Besides weight loss, studies have shown that bariatric surgery prolongs life expectancy, possibly from a reduction in incidence of malignancies, and it lowers cardiometabolic risk factors, resulting in decreased cardiovascular events (Sjostrom et al, 2007). The procedures commonly carried out in the NHS are laparoscopic Roux-en-Y gastric bypass surgery (RYGB), laparoscopic adjustable gastric band (LAGB) and laparoscopic sleeve gastrectomy (LSG). RYGB is both restrictive (reducing the amount of food eaten) and malabsorptive (reducing the absorption of food), while LSG and LAGB are anatomically restrictive surgeries with differential physiological effects.

Apart from weight loss, bariatric surgery can lead to remission of type 2 diabetes. The success rates differ with different techniques; for LAGB, remission

is reported to be between 58% and 62%, while for RYGB it is between 71% and 83% (Buchwald et al, 2004; 2009). One hypothesis for the difference in remission is the effect of hormonal changes, especially glucagon-like peptide-1 (GLP-1) following RYGB. Post-prandial GLP-1 levels are increased after RYGB (Yousseif et al, 2014). Although weight loss and type 2 diabetes remission results are better for RYGB, it is the most costly option, requires a longer hospital stay, and has a higher short-term complication rate and mortality, as well as the need for life-long nutritional supplementation after the operation. Over time, weight regain is common after both procedures and while diabetes may initially go into remission, it may well reappear at a later date.

Conclusion

The rising prevalence in obesity has led to the increasing prevalence of type 2 diabetes and this had led to the use of the term “diabetes”. Smoking cessation and reduction in alcohol intake, alongside dietary and lifestyle advice, will help in weight reduction and if not, at the very least promote weight maintenance and prevention of complications. Modest weight loss can be achieved through dietary changes and intensive lifestyle interventions. Helping people with type 2 diabetes achieve weight loss will improve HbA_{1c} control and other cardiometabolic risk factors. Life expectancy may also be prolonged from weight loss. Currently, for those with type 2 diabetes and extreme obesity, the most effective treatment is bariatric surgery. ■

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“Currently, for those with type 2 diabetes and extreme obesity, the most effective treatment is bariatric surgery.”

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. There is ONE correct answer to each question. 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.

1. What is the projected obesity rate in the UK population for the year 2050?

Select ONE option only.

- A. 25–30%
- B. 30–35%
- C. 35–40%
- D. 40–45%
- E. Greater than 50%

2. What is the projected economic cost of excessive weight and obesity in 2050?

Select ONE option only.

- A. £30 billion per year
- B. £40 billion per year
- C. £50 billion per year
- D. £60 billion per year
- E. £100 billion per year

3. What is the reported remission rate for type 2 diabetes after laparoscopic adjustable gastric band?

Select ONE option only.

- A. 90–97%
- B. 83–90%
- C. 71–83%
- D. 62–71%
- E. 58–62%

4. What is the reported remission rate for type 2 diabetes after a Roux-en-Y gastric bypass? Select ONE option only.

- A. 90–97%
- B. 83–90%
- C. 71–83%
- D. 62–71%
- E. 58–62%

5. Which medication causes weight gain as a potential side effect?

Select ONE option only.

- A. Beta adrenergic receptor blockers because they block the metabolism of fat as an energy source
- B. Dipeptidyl peptidase-4 (DPP-4) inhibitors because it is linked to inhibition of serotonin receptors; thus it is an appetite stimulant
- C. Angiotensin-converting enzyme (ACE) inhibitors because they inhibit dopaminergic receptors and enhance gluconeogenesis
- D. Metformin because it increases insulin and leptin levels
- E. Glucagon-like peptide-1 (GLP-1) analogues because they result in enhanced glucagon release

6. What is the recommended goal for people who are trying to lose weight?

Select ONE option only.

- A. 1.0–2.0 kg per month
- B. 0.5–1.0 kg per month
- C. 5.3–10.0 kg per week
- D. 1.9–5.0 kg per week
- E. 0.5–1.0 kg per week

7. Which following statement is not true in regards to bariatric surgery?

Select ONE option only.

- A. Bariatric surgery results in lower cardiovascular incidence and deaths
- B. Bariatric surgery leads to improvement and sometimes remission in cardiovascular risk factors such as type 2 diabetes
- C. Weight reduction achieved from bariatric surgery is 20–32% in 2 years and only 10–25% after 5 years.
- D. Bariatric surgery is not cost effective for the NHS
- E. Bariatric surgery has been shown to result

in improvement in the general and weight-specific quality of life, depression scores, self-esteem and physical activity

8. Which of the following medications for diabetes management result in the greatest HbA_{1c} reduction? Select ONE option only.

- A. Metformin
- B. Sulphonylureas
- C. Glucagon-like peptide-1 analogues
- D. Dipeptidyl peptidase-4 inhibitors
- E. Insulin

9. Which of these statements is not true for orlistat? Select ONE option only.

- A. Orlistat can lead to malabsorption of vitamin A
- B. Orlistat cannot be used in children
- C. Orlistat should be discontinued if no weight loss is achieved after 3 months of treatment
- D. Orlistat should be continued for more than 12 months for weight maintenance
- E. Orlistat has been shown to be effective for modest weight reduction

10. Which of the following statements is not true regarding weight management? Select ONE option only.

- A. At 12 months, a very low energy diet and a low energy diet both result in similar weight reduction
- B. The recommended amount of physical activity is 300 minutes of moderate intensity activity per week
- C. Young women should seek early pregnancy after bariatric surgery as the body is most fertile at that time
- D. Patients often have unrealistic expectations of successful weight loss
- E. Smoking cessation is associated with weight gain, while reducing alcohol intake can help in weight reduction