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Nutrition: weight management

Introduction

An informal internet search on “weight loss” through a popular search engine for the purposes of this article yielded over a billion (a thousand million) hits. This is not surprising, since Moss (2016) found almost 2/3 of British adults are on a weight-loss diet “most of the time” and almost half had tried to lose weight in the previous year. It is also big business; the first page of the internet search had 15 sites and 7 (nearly half) were adverts for commercial organisations making claims for their weight loss programmes. Despite this, in the UK obesity rates nearly doubled between 1993 and 2011, from 13% to 24% in men and from 16% to 26% in women (NICE Guidelines, 2014).

So, how should the nurse advise adult clients seeking help with weight-loss?

Nurses may first need to review their own belief system and behaviours. It appears negative stereotypes and stigmatising of obese clients by health professionals continues and, in contrast to other negative stereotypes, can even be perceived as socially acceptable (Phelan et al, 2016; Pervez and Ramonaledi, 2017). This can express itself with the professional less likely to engage in client-centred communication with the obese client, being less respectful, and holding lower expectations of concordance or of a successful outcome (Phelan et al, 2016). This adds to the clients’ anxiety and tendency to avoid healthcare.

The need for weight loss

First, nurses must identify whether the client seeking help does indeed need to lose weight. The requirements of fashion are more rigorous than those for health, and many people wish to lose weight for aesthetic rather than health reasons. Advising such people is outside the scope of this article, along with caring for those who are underweight.

One of the best-known measures for weight is the ratio of weight and height. This is often expressed as body mass index (BMI) and is calculated from measurements of height and weight.

$$BMI = \frac{\text{weight (kg)}}{\text{Height (m)}^2}$$

This is a useful ready reckoner, but it is not unfailingly accurate. People who have an unusual physique require different assessments. Famously, people with very high muscle mass have a high BMI due to muscle being heavier than adipose tissue, yet such people are not truly overweight or obese because they do not carry too much adipose tissue. Hosie (2017) in *The Daily Telegraph* featured a personal trainer who claimed to have been informed he was obese. BMI should therefore be interpreted with caution.

To be very large is bad for health. For some years there has been controversy regarding people with a BMI of 25-29 because these people seemed quite healthy. However, Klastky (2017) followed up a heterogenous sample of over a quarter of a million people, for 30 years. They found the relative risk (rr) of dying (from all causes) was 1.1 for people with a BMI lower than 18.5. Which means that if 100 people of normal weight died, then 110 people who were underweight would die. This was the same risk as those with a BMI of 25-29. The relative risks of dying for people of varying BMIs is presented in table 1.

BMI	**rr of death**
below 18.5 **underweight**	1.1
18.6-24.9 **ideal or normal weight**	1 (the reference)
25-29.9 **pre-obese or overweight**	1.1
30-34.9 **obesity 1**	1.4
35-39.9 **obesity 11**	2.0
>40 **obesity 111 or morbid obesity**	2.7

Table 1: definitions of obesity (NICE Guidelines, 2014) with relative risk of dying over 30 years (Klatsky et al, 2017)

A recent meta-analysis of 23 studies (Opia et al, 2020) provided further convincing evidence that being overweight or obese is a risk factor for illness. Opia et al (2020) showed that this incurs a risk of developing cardiovascular disease and this risk is present even in the absence of other risk factors such as hypertension or diabetes. They calculated the rr of a cardiovascular event as 1.58 for obese people, compared to those of normal weight. The rr for overweight adults was 1.34. Opia et al, (2020) argue the term "healthy and overweight or obese" should not exist.

As identified above, BMI can be misleading, and it is possible waist measurements can be more accurate. This is because body fat around the middle – the site of important organs – is particularly damaging to health. The NHS (2018) recommends that, regardless of height or BMI, an individual should seek to lose weight if they have a waist measurement of over 94cm (37in) for men and 80cm (31½in) for women. A more complex calculation is to assess waist circumference to height ratio (Smolinski et al, 2018).

Targets for weight loss

For people who need to lose weight, the NHS (2019) recommends losing 0.5-1kg (1-2lbs) a week. Many people would like to lose weight quicker than this; it is interesting to note the internet search, described above, suggested the default search of "lose weight fast". Coutino et al (2018) discussed that rapid weight loss could be associated with a greater loss of fat free mass (most individuals should aim to lose weight from fat stores) and a reduction in basal metabolic rate (BMR, which would mean the individual uses less energy most of the time, which would make weight loss more difficult). See Box 1 for an explanation of BMR and energy. To investigate, Coutino et al (2018) compared two groups of obese clients, one lost weight rapidly whilst the other lost weight steadily. Once a stable weight was achieved, no difference in body composition was found, which they acknowledge was unexpected. On the other hand, those who had lost weight slowly retained a higher BMR and used more energy whilst exercising. This suggests those who had lost weight slowly may be able to maintain their new weight more easily but unfortunately, Coutino et al (2018) did not continue the observations long enough to confirm this. They do note, however, that those in the rapid weight loss group experienced less severe hunger, possibly due to the appetite-suppressant effect of ketosis. However, these findings are contradicted by Hintze et al

(2019), who used a rather similar approach to compare obese women dieters and found no evidence of a decrease in BMR or appetite in either the rapid or steady weight loss groups. Both groups were equally successful but, again like Coutino et al (2018), there was no long-term follow up. This is important if those who lose weight rapidly could be more prone to re-gaining it. Yet Vink et al (2016) found no difference between dieters who lost weight quickly and those who did so slowly. Since many clients seek rapid weight loss and this is often encouraging and motivating for them, nurses may need to reconsider some traditional advice.

Guidance for weight loss

The professional press recognises that, despite decades of research, strategies to tackle obesity are often unsuccessful (Eichorn and Jevert-Eichorn, 2021). Advising such clients is complex and many nurses feel under-prepared for this (Keyworth et al, 2012). Added to this, nurses themselves are not exempt from being too heavy and, at least for some, this can add to their discomfort in advising patients on lifestyle modifications (Pearce, 2020).

There is only one way to lose weight, and that is to take in less energy than is used (Thomas et al, 2012).

Weight change = energy input less energy output.

In mammals, energy input is only in the form of diet. Energy output is all the energy used to sustain life. See box 1 for some details of this. Therefore, to lose weight clients must take in less energy in the diet compared to the amount they use. The simplest, and least controversial, way to lose weight is through restricting energy intake in the diet – calorie counting.

Calorie counting: The NHS approach

The NHS recommends people who wish to lose weight should restrict their calorie intake over a period of 12 weeks (NHS, 2019). It is based on women taking no more than 5.8MJ (1,400kcal) a day and men taking no more than 7.9MJ (1,900kcal) a day. This should lead to a weight loss of 0.5-1kg (1-2lbs) a week. The NHS website (and there is a free app for smart-phone users) provides a wealth of recipe suggestions, activities, and motivating reading to

help with this, for the reality is this is hard work and can be discouraging. One issue that is almost certain to arise is the occasional eating more than the scheme allows. There is a danger that, having made one mistake, the dieter abandons the diet for the remainder of the day or longer. The NHS counters this by recommending reducing the energy intake the following day. However, this may be unduly harsh, and the nurse may prefer to encourage them to resume the usual diet as soon as possible, rather than appearing to punish the mistake.

There is a wide variety of food products marketed to people who wish to lose weight. Most are badged as “low fat”, “low calorie”, or “no added sugar”. Whilst occasionally useful, these may not be suitable for long-term use. There is some evidence foods adapted to be “healthy” in one respect are less helpful in others, to make the food more palatable. Thus Nguyeen, Lin and Heidenreich (2016) found foods marketed as low fat had more sugar in them, although the overall energy content was lower. Further, foods marketed as low-fat risk people believing them to be healthy and eating more (Geyskens et al 2007). People can also get bored, because Turnwald and Crum (2019) investigated the effects of labelling foods and found foods marketed as tasty were chosen more often in the long-term compared to the same food marketed as healthy.

It is simpler, and possibly more successful in the long term, for people to simply eat less. Portion sizes have increased over the last few decades (Zheng et al, 2017), and this has led to people expecting to eat more. In a series of experiments, researchers in Liverpool (Robinson and Kersbergen, 2018) showed the perception of what is normal can be recalibrated, so people choose to eat less. This is a gradual process and could be encouraged by simple strategies such as using smaller plates (Pratt, Croager, and Rosenberg, 2011).

Other approaches to calorie counting

Taking a low energy diet for 12 weeks to achieve modest weight loss is difficult for many, and there are schemes which nurses could consider recommending.

One possible approach is to use fitness trackers. There are several on the market, they claim to provide the wearer with information about energy usage. The wearer can then use that

information to plan their diet. One potential and serious problem is that they may over-estimate the energy used. An investigation for the BBC (2019) found most fitness trackers over-estimated energy use, some by as much as 50%. Hyun-Sung (2017) also found trackers inaccurate, especially amongst adults who were "free-living", in other words, those who were not engaged in supervised activities and exercise. The makers of the fitness trackers told the BBC their devices were based on "extensive research" (BBC, 2019) but acknowledged they are not medical devices.

If the client is seeking more support and encouragement than their health professional can provide, they could consider joining a commercial organisation, such as *Weightwatchers* or *Slimming world*. These organisations provide up-beat, motivational materials and contact with others, which can provide the all-important encouragement. They often use simple diet schemes based on points, which some may find simpler than calorie-counting, although that is what they are based on. These are commercial organisations which charge a regular fee, typically over £5.00 a week. This may be a problem to some people, but others find this a helpful motivation to keep going with the scheme.

A potential approach to energy restriction is intermittent fasting (I.F.). This has been practiced by religious communities for generations (Hoddy et al, 2020). I.F. can involve different patterns, but for weight loss typically involves eating normally (i.e., to meet energy expenditure) most days but severely restricting energy intake on just a few days. One pattern is to eat to requirements 5 days a week and to eat between ¼ and 1/3 of energy requirements on two days a week (the 2:5 diet). A recent review (Welton et al, 2020) found several trials demonstrating this approach is promising for weight loss, although the review authors comment that the trials varied in their approach and were all of short duration, the longest-lasting trials were 12 months. The achieved weight loss is the result of reduced energy intake overall, but there may be additional benefits, outlined by Khedkar (2020) and Hoddy et al (2020). These include good glycaemic control; an alteration in gut flora to encourage energy usage in the person; increased levels of adiponectin and decreased levels of leptin in the blood, which could improve energy usage and decrease appetite; and changes to circadian rhythms which may promote cardiac health. Further, I.F. may lower inflammatory markers, which are often increased in obesity and may cause some of its associated complications. At least some of these changes appear independent of weight loss

(Hoddy et al, 2020). Finally, and perhaps most importantly, dieters may find they can sustain I.F. indefinitely, because it is flexible, does not require severe, sustained monitoring of their diet, and is often not characterised by unpleasant hunger (Hoddy et al, 2020).

All the methods discussed so far involve making daily choices in food, which some people find confusing, difficult, and depressing. One possible approach is meal-replacement schemes. This is where two or three meals a day are replaced by a specialised, purchased drink. These are very low energy yet must, by UK law, provide certain nutrients and so the dieter can be assured they are likely to be taking in the essential nutrients without having to calculate this. These can be successful in lowering blood sugar (Konig et al, 2014) or reducing body fat (Shih et al 2019). However, these trials typically last for only a few months (just 8 weeks in the case of Shih et al, 2019) and it is possible that, on their own, they do not help the dieter learn to choose and sustain a healthy diet. Further, the foods may include unacceptable amounts of salt, low amounts of fibre (Shih et al 2019), are expensive and can cause the dieter to miss the pleasure of eating meals with friends.

Alternatives and supplements to energy restricted diets

Physical activity

Most obese adults should increase their physical activity (NICE Guidelines, 2014). This may need to increase gradually if the client is very unused to strenuous activity. The target however, is 45-60 minutes activity of moderate intensity each day. This could mean walking, cycling, or swimming. The activity is more likely to be sustained if it is enjoyed and can be incorporated into everyday life. However, it is misleading to imply the energy required for most activities will, in the first instance, lead to weight loss. The meta-analysis conducted by Thomas et al (2012) concluded some people may decrease their resting metabolic rate when they exercise. This unhelpful effect was most pronounced in those who were not obese, and obese subjects used more energy during and after exercise. Further, exercise is an appetite stimulant and Thomas et al (2012) suggested there was a risk people may increase their energy intake following exercise.

However, an increase in physical activity is part of almost all weight-loss programmes and there are several reasons for this. Energy restriction on its own leads to generalised loss of

weight but accompanying the diet with exercise can lead to a loss of adipose tissue and preservation of lean body mass, or muscle tissue. This could increase resting energy rate and thus BMR. Adding exercise to diet programmes increases cardiovascular health (Blumenthal et al, 2010), improves sleep, and emotional wellbeing.

Pharmacological interventions

People on weight-loss diets must decrease their energy intake but their needs for other nutrients usually remains the same. Nurses should consider whether the dieter needs nutritional supplements, especially in lipid soluble vitamins and essential fatty acids (Iglesia et al, 2019). This is because, for reasons not fully understood, obese people are often under nourished in some of the micronutrients (Ruxton, 2011) and a weight loss diet could compound this.

There are drugs available which may assist with weight loss, although some are not approved in the UK or Europe due to safety concerns (Woloshin and Schwartz, 2014). Patients learn about these on the internet and may be keen to take them, encouraged by tales of success included in online fora (Fox, Ward, and O'Rouke, 2004).

They work through a variety of mechanisms, which are outlined below.

- Orlistastat (*Orlos*) is the only drug approved of in the UK specifically for the control of obesity. It inhibits lipase and thus reduces the absorption of dietary lipid. The lipid therefore remains in the bowel, which can cause discomfort.
- Naltrexone with bupropion (*Mysimba*) is a serotonin and nor-adrenalin reuptake inhibitor. It has been used within the NHS to help with weight-loss but is no longer recommended due to its unacceptable neurological effects.
- Liraglutide (*Saxenda*) is administered subcutaneously and activates the glucagon-like peptide receptors. This increases insulin, decreases glucagon, and delays gastric emptying, leading to appetite suppression and feelings of fullness. Its use is approved in the UK, and it can be obtained through the NHS. As part of a well-managed weight-loss regime, it leads to a loss of about 6kg in the first year (JAMA, 2016), but the effect may reduce after that, and it is accompanied by some gastrointestinal discomfort.

- Lorcaserin (*Belvic*) is an agonist of the 5-HT_{2C} receptors in the hypothalamus, which supresses appetite. It was never approved in the UK and was withdrawn from the US market in January 2020, following concerns that a higher-than-expected number of patients taking it were subsequently diagnosed with colorectal, pancreatic, and lung cancers.
- Phentermine and Topiramate are often taken together (*Qsymia*). Phentermine is a sympathomimetic drug and increases metabolic rate. Topiramate is an anticonvulsant drug which stabilises the membranes of neurones and reduces appetite. However, Qsymia is not currently available in the UK, due to concerns about possible addiction and other mental health problems.

Surgical interventions

People who are obese 111 or obese 11 with comorbidities and have not responded to other interventions may require bariatric surgery. Aterburn et al (2020) reviewed these procedures and found they lead to good weight loss. There were other benefits, for example, patients with type 2 diabetes showed improved glycaemic control and patients with hypertension or sleep apnoea showed improvements to their conditions. Aterburn et al (2020) acknowledged these are major procedures on unwell patients but showed the mortality has much improved to 0.03-0.2%.

Conclusion

This article has shown many adults need to lose weight and wish to do so, but it is a complex and long-term undertaking. The nurse should offer guidance, based upon a sound scientific rationale, and sympathetic encouragement.

Healthcare has now mostly adopted the SI system of units, and energy is measured in Joules. However, many people prefer the traditional calories and nurses may need to be familiar with both.

1 kilojoule (kJ) = 1,000 joules

1 megajoule (MJ) = 1,000,000 joules

1 kilocalorie (kcal) = 1,000 calories, or 1 'dietary Calorie'

To convert from one unit to another:

1 kcal = 4.184 kJ, so a 1000 kcal diet provides 4.184 MJ or 4184 kJ

1 MJ = 239 kcal

The basal metabolic rate (BMR) is the rate at which a person uses energy to maintain the basic functions of the body – breathing, keeping warm, keeping the heart beating – when at complete rest. An average adult will use 4.6kJ (1.1kcal) each minute to fulfil BMR. To estimate energy requirements, BMR is multiplied by the physical activity level, which is usually between 1.4 to 1.9, depending upon how active the individual is.

So, energy expenditure = BMR x physical activity level.

Using this, most men require 2100-2550MJ/day (8.77-10.6kcal/day) and most women require 1810-1940Mj/day (7.61-8.1kcal/day)

box 1: expressing energy in the diet (based upon the British Nutrition Foundation (2009)