Effective management of obesity

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Introduction
This paper is based on Effective Health Care Vol 3, No 2.
People who are obese or overweight have a higher risk of disease including coronary heart disease, diabetes, hypercholesterolaemia, hypertension, gall stones, degenerative joint disease, and obstructive sleep apnoea, and thereby reduced life expectancy. Even modest weight loss of around 5 kg may produce important health benefits and reduce the costs associated with treating some of these conditions.

Recent epidemiological surveys in Britain indicate that the prevalence of obesity in men and women aged 16 to 64 is about 13% and 16% respectively3 (double the rates in 1980)4 and increasing.5 This trend is likely to be due to a combination of increased dietary fat and decreased levels of physical activity.6

Health professionals may have a negative attitude to people who are obese; they may lack interest in the condition and feel frustrated because successful treatment is often long term or elusive8 and primary healthcare teams are not always adequately trained in the prevention and treatment of obesity so they may not take positive action to help patients lose weight.9

This paper summarises the results of a systematic review of evaluations of interventions to reduce obesity and overweight presented in a recent Effective Health Care Vol 3, No 2, and published in full elsewhere.10

Methods
The relevant literature was identified by a search of computerised databases (including MEDLINE, EMBASE, BIDS, and PSYCHLIT), citations in identified reviews, and consulting experts. Only the results from randomised controlled trials with at least a one year period of observation (including both treatment and follow up) were included (in the case of prevention of obesity, or the use of alternative treatments, non-randomised controlled trials with a concurrent control group were also included). Data at each stage of the review were checked by two reviewers.

Results
Ninety nine studies contained in 96 full articles and one abstract12–108 met the review criteria. Many had methodological problems, such as small sample sizes and high rates of attrition, leading to low power and potential bias, and only 6% carried out analysis on an intention to treat basis. Furthermore, studies recruiting participants by methods such as advertisements may not be generalisable to less motivated people seen routinely in primary care. The table summarises the studies on which some of the key conclusions of this paper are based, and full details are available elsewhere.11

No studies of alternative treatments and none evaluating the effectiveness of commercial weight loss programmes—such as those provided by Weight Watchers or Slimming World—met the inclusion criteria and few economic evaluations have been published.12 Long term decreases in body weight in the general population may need national or local initiatives aimed at the social and environmental conditions that contribute to increasing levels of obesity.13 However, no reliable studies of such policies were identified.

PREVENTION
Only one preventive trial in children14 and three in adults were found (table).15–17 Family treatment (defined as a model of treatment aimed at involving the family) was shown to be more effective in preventing the progression of obesity in 10–11 year olds than conventional dietary and exercise treatments or no intervention.18

The prevention of adult obesity was considered by three community studies which made comparisons with no-intervention control groups. Both those using an educational programme alone19 and those with added financial incentives20 resulted in reduced average weight gain. The trial of social learning and communication skills, however,21 failed to show any benefit.

TREATING CHILDHOOD OBESITY
Eleven trials evaluating treatments of children with obesity were found.16–28 All had fewer than 40 participants in each group, and six were carried out by a single research group.21–24

Two trials, both of good quality, suggest that an effective strategy is to use interventions designed to reduce sedentary behaviour (table).21,25 The “Shapedown” programme consisted of various cognitive, behavioural, and affective techniques adapted to make successive small sustainable modifications in diet, exercise, and communication; restrictive diets
### Table 1: Summary of key studies in selected areas a)

<table>
<thead>
<tr>
<th>Author (year), design</th>
<th>Participants, interventions, sample size</th>
<th>Key long term results</th>
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<tr>
<td>Foa et al (1995) Swedish, RCT, 14-18 month intervention</td>
<td>Swedish children (10-11 years old) identified in a school screening programme for obesity (BMI of 2.8-25 kg/m²). Group 1: Family treatment + conventional treatment (diet counseling + encouragement to exercise) + family maintenance (25%); Group 2: conventional treatment only (19%); Group 3: unrelated control group (n=50). Groups BMI comparable at baseline.</td>
<td>At 1 year postintervention follow up. Family treatment group showed significant weight loss (P&lt;0.01) compared to both control groups (P&lt;0.001) and fewer children with severe obesity (5% vs 29%, P&lt;0.002). No significant differences between conventional treatment plus family intervention and control group. Attrition. No data on dropouts recorded. Analysis carried out on intention to treat basis.</td>
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<td>Forrest et al (1988) USA, RCT, 1 year community based intervention</td>
<td>Participants &lt;15% of ideal weight from the Minnesota Heart Health Program. Group 1: medically supervised diet only; Group 2: medically supervised diet + exercise; Group 3: no treatment at all. Groups comparable at baseline.</td>
<td>Mean weight change adjusted for height (SE) 1 year posttreatment. Group 1 showed a significant difference compared to the treatment group and 56% of the controls maintained or lost weight over the 1 year intervention (P&lt;0.001). No significant difference in attrition. Group 2 and 3, however, showed a significant attrition. Groups BMI comparable at baseline. Survey results. BMI change (SE); baseline to year 6. Group 1 vs 0.57 (0.22). Group 2 vs 1.25 (0.23). P&lt;0.05. Cohort results. No significant differences in treatment on rates between groups at 5 years. All groups gained weight, cohort response rates 56-70%.</td>
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<td>Taylor et al (1991) USA, 4 surveys of random households and a cohort in reference and intervention cities, 6 year intervention</td>
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<td>Relative weight loss (SD) at 1 year follow up compared with baseline. Group 1 vs 14.3% (P&lt;0.01). Group 2 vs 15.2% (NS). Attrition. Overall rate was 16%, data were analyzed on an intention to treat basis.</td>
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<td>Wadden et al (1987) USA, RCT, 3 month intervention, 1 year follow up</td>
<td>12-18 year olds (15.6 years mean) recruited through local papers and notices to physicians and schools. Group 1 Shapedown program: Self-directed for parents, encouraging adolescents to make small modifications in diet, exercise, lifestyle, and stress (n=37, relative weight 136.3%). Group 2: no treatment comparison (n=29), relative weight 129.5%. Groups comparable at baseline.</td>
<td>Mean change in % overweight at 1 year. Group 1 vs 18.7%. Group 2 vs 10.1%. Groups 1 vs 3; significant reductions in body fat between the sedentary (4.7%) and exercise groups (&lt;1%) at 1 year (P&lt;0.05). Attrition. Overall rate was 9.8%, dropouts were excluded from the analysis.</td>
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<tr>
<td>Epstein et al (1987) USA, RCT, 4 months of weekly treatment, followed by bi-monthly meetings up to 1 year</td>
<td>Obese 8-12 year olds (10.1 years mean age) recruited through radio advertisements, TV commercials, and direct recruitment. Those who were not 20-100% overweight (mean ±2SD), neither parent greater than 100% overweight, one parent willing to attend meetings. A traffic light diet was used with children and parents (1000-1200 kcal/day). A families entered treatment, group data were not reported. Group 1: sedentary group: reinforced decreasing the amount of time they spent in certain sedentary activities; group 2: exercise group: reinforced physical activities. Group 3: combined group: both of the above. Groups comparable at baseline.</td>
<td>Mean change in weight at 1 year follow up Group 1 vs 4.7 (7.3 kg). Group 2 vs 6.9 (16.7 kg). Group 3 vs -12.9 (9.3 kg). Weight loss for the combined treatment was significantly greater than that for diet alone (P&lt;0.05). Men lost more than women body weight: males 23%, females 1% Group 1 vs 1; year follow up Attrition. Group 1 vs 0%. Group 2 vs 0%. Group 3 vs 1.5% dropouts were excluded from the analysis.</td>
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<td>Wadden et al (1986) USA, 6 months intervention, 12 months follow up</td>
<td>Subjects at least 25 kg overweight recruited by newspaper ads (mean baseline weight 109±5 kg). 1 very low calorie diet group. Group 1: 1200 kcal diet set by a dietitian with school screening project (12-17.4 years). Group 2: no treatment control (n=23). Group 2 only very low calorie diet treatment group: 1000-1200 kcal diet throughout. Tought conventional behavior behaviour of weight control (n=16). Group 3: very low calorie diet + standard treatment. As for Group 1 plus extra monthly 1000-1200 kcal. Extensive behaviour treatment (n=19). Groups comparable at baseline for age, height, weight and percentage overweight.</td>
<td>Mean weight change at 1 and 5 years follow up. Group 1 vs 4.7 (1.9 kg). Group 2 vs -2.96 (0.4) kg. Group 3 vs -8.7 (2.4 kg). Very significant (P&lt;0.05) at 1 year, with the two behavioural treatments superior to control group at 5 years. 64% regained all weight lost. 5% maintained all weight loss. Attrition. Overall rate was 14.6%, evenly distributed across the conditions.</td>
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<td>Wing et al (1986) USA, 26 week intervention, 1 year follow up</td>
<td>Adult women, screened to eliminate any contraindications to VLCD (medically supervised, BMI 20-35 kg/m²) and who were able to continue at home (n=13). Group 1: 1 very low calorie diet group and 2 sets of activity plans recorded (n=31). Group 1 and 2 were given 400-500 kcal/day diet for 2 months and 1000 kcal/day diet for the remainder of the year. Group 2 received 1200 kcal diet for the entire 6 months. No data on group comparability Group 1: very low weight loss. Young-15,55 years, not pregnant, were recruited (mean baseline BMI =52 ±3 kg/m²). Group 1: standard behavioural treatment only (n=40). Group 2: standard behavioural treatment plus written meal plans and weekly grocery list (n=41). Group 3: as for group in diet + provision. Cost of foods used by participants (n=41). Group 4 as for Group 3 except that food provided free of charge (n=41). Groups comparable at baseline.</td>
<td>Mean weight change at 1 year follow up compared to baseline. Group 1 -3.3 kg. Group 2 -6.9 kg. Group 3 -7.5 kg. Group 4 -6.6 kg. Weight loss for group 1 was significantly smaller than those in groups 2-4 (P&lt;0.02). Attrition. 12% by the year follow up. No significant differences in dropputs rates between group.</td>
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<td>Perri et al (1988) USA, 14 week weight loss programme, 21 month maintenance intervention</td>
<td>Healthy adults, aged 21-40 years receiving an initial behavioural weight loss programme. Maintenance interventions: Group 1 standard behavioural treatment + weight maintenance and exercise programmes, including the formation of peer groups (n=30). Groups comparable at baseline for weight and percentage overweight.</td>
<td>Mean weight change at 21 months. Group 1 vs 0.4 (3.6) kg. Group 2 vs -4.3 (7.0) kg. Group 2 vs -10.1 (7.5) kg. Significant difference between group in 20 weeks (P&lt;0.01). No significant differences between the 21 month maintenance programme (all dropouts were from group 1). Attrition. 23% due to different body composition between group difference, (P&lt;0.05). Dropouts excluded from analysis.</td>
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<td>Kramer et al (1986) USA, 1 year maintenance programme following a 15 week weight loss programme</td>
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<td>Mean weight change at end of 1 year maintenance programme. Group 1 -8.0 (8.2) kg. Group 2 -7.0 (5.9) kg. Group 3 -8.5 (7.0) kg. All groups had regained about 40% of initial weight loss by the end of the maintenance intervention. No significant differences. Percentage of subjects maintaining original weight loss. Group 1 18%. Group 2 14%. Group 3 23%. Attrition. 22% attrition rates did not differ significantly between groups. Attrition. 22% drop out. Not included from the data analysis.</td>
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<td>Perri et al (1984) USA, 15 week intervention, 1 year follow up</td>
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<td>Weight loss (SD) at 1 year follow up. Group 1 vs 5.3 (7.0 kg). Group 2 vs 6.7 (9.4 kg). Group 3 vs 9.6 (12.1 kg). Group 4 vs 10.6 (16.2 kg). Group 5 vs 12.1 (16.7 kg). Significant difference between group in 10 weeks (P&lt;0.05). Attrition. Significant improvement in weight maintenance compared to baseline. Group data are not given. Attrition. 22% attrition rates did not differ significantly between groups. Attrition. 22% drop out. Did not differ from subjects who completed treatment.</td>
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<td>Stevens et al (1993) USA, 18 month intervention/maintenance</td>
<td>Adolescents, 10 to 14 years, participated in the study (n=126). Group 1: non-behavioural treatment plus no further contact. Group 2: behaviour treatment plus no further contact. Group 3: behaviour treatment plus relapse prevention training plus no further contact. Group 4: non-behavioural treatment plus post-treatment contact by mail and phone. Group 5: behaviour treatment plus post-treatment contact by mail and phone. Group 6: behaviour treatment plus relapse prevention training plus post-contact treatment by mail and phone. Groups weight and percentage overweight comparable at baseline.</td>
<td>After 18 months, 45% of the men and 26% of women in the intervention group had met their weight loss goal of 4.5 kg, compared with 13% and 18% of the control group. The difference in weight loss between intervention and control (SBQ SE) at 18 months was 3.9 (0.4) kg (overall P&lt;0.001), 4.7 (0.5) kg for men, and 3.8 (0.8) kg for women (P&lt;0.04). Attrition, overall 7.1%.</td>
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</table>

*Details of all trials included in the review are available.**

RCT = randomised control trial; VLCD = very low calorie diet.
were avoided, and parents were trained to support their children’s weight loss efforts. Epstein et al. found that behavior modification based on reinforcement (using rewards), aimed at reducing sedentary activity—for example, watching television, playing computer games—was more effective than reinforcing increased physical exercise, or a combination of these interventions.

No long term benefit for weight loss in children was found by the addition of controlled exercise to diet. There is conflicting evidence over the effectiveness of treating obese parents and children together, and the involvement of parents in children’s treatment programmes. The value of parental involvement may be greater for the treatment of younger children (5–8 year olds).

TREATING ADULT OBESITY

Reliable evaluations of dietary, exercise, or behavioral approaches, either alone or in combination, and pharmacological and surgical treatments were found.

Behavioral interventions alone

Behavioral techniques such as conditioning and managed reinforcement, based on the idea that much behaviour is learned and reinforced by particular social circumstances, are commonly used for the management of obesity. Thirteen randomised controlled trials evaluated various behavioural approaches to the treatment of obesity in adults, five of them examined cognitive treatment. Overall, there is little reliable evidence that behavioral treatments by themselves are effective.

One study provided evidence that cue avoidance (of situations that provide the temptation to overeat) is more effective than cognitive approaches involving role play to rehearse resisting overeating, or social pressure. One study showed that daily weight charting increased the effectiveness of a behavioural programme. There is no evidence of a difference between long term effects of individual and group treatment.

Behavioral interventions with an exercise component

Four trials evaluated exercise in conjunction with behavioural weight loss programmes. Supervised aerobic exercise sessions resulted in more sustained weight loss than the provision of exercise education, although light exercise, such as callisthenics and stretching, was shown to be just as effective as moderate aerobic exercise and the combination of diet and exercise may be more beneficial for weight loss than diet alone.

Dietary interventions alone

Only two studies assessed diet alone. These indicate that fibre supplements were more effective than placebo at increasing weight loss when given in conjunction with a 1200–1600 kcal/day diet, although this does not seem to lead to a greater mean weight loss than a low fibre and low calorie diet.

Dietary interventions with a behavioural component

Most studies of diet (12 randomised controlled trials) included a behavioural component. Two trials assessing very low calorie diets and standard behavioural treatment showed that these combined strategies were more effective than diet alone (table). Standard behavioural treatment combined with the provision of meal plans and grocery lists produced significantly greater weight loss than standard behavioural treatment alone (table).

Pharmacological interventions

Fourteen studies examining pharmacological interventions were included in the review, most studies evaluating drugs which aim to reduce energy intake, in particular the selective serotonin agonist dexfenfluramine. Pooling the results of four randomised placebo controlled trials (including a 24 site multicentre randomised controlled trial) shows a significantly greater reduction in weight loss at one year in those receiving dexfenfluramine (−2.6 kg, 95% confidence interval (95% CI) −3.8 to −1.3). However, a three group randomised controlled trial found no significant difference between a group receiving dexfenfluramine (15 mg twice a day for three months) combined with one year of nutritionist consultation, and groups receiving nutritionist consultations alone (either at home or in a clinic) and behavioural treatment.

The combination of fenfluramine (a variant of dexfenfluramine) and a sympathomimetic drug (phentermine) has only been evaluated in placebo controlled trials of short duration. Side effects, such as gastrointestinal disturbances, have been found in those taking centrally acting appetite suppressants; however, these effects are usually not severe and are transient. The risk of pulmonary hypertension has been shown to increase when such treatment is used for a total period of more than three months. However, the absolute risk is still very low. The availability of appetite suppressants has led to a “drug frenzy” in the United States. It is important that antiobesity medication is used cautiously in carefully selected obese patients, and only as an adjunct to diet and lifestyle management.

Two new drugs in this area, sibutramine and orlistat, are presently under study. Sibutramine is a serotonin and noradrenergic reuptake inhibitor, whereas orlistat works by reducing the absorption of dietary fat through the inhibition of triglyceride hydrolysis. A multicentre double blind randomised controlled trial of sibutramine showed weight loss during the first six months, with weight remaining stable for the next six months but with only around 1.5–2.5 kg extra weight loss compared with placebo at 12 months.

Surgical interventions

Surgical treatment is normally considered only in people with morbid obesity (body mass index >40) because it is associated with a higher risk of premature death and when less
invasive methods of weight loss have failed. 

Fifteen studies of surgery met the inclusion criteria, examining gastric bypass, gastropasty, jejunoileal bypass, gastrogastronomy, and the gastric balloon. 

Jejunoileal bypass, vertical banded gastropasty, and gastric bypass have all been found to produce a significant weight loss. However, the jejunoileal bypass procedure is associated with long term complications, arising as long as 10 or 15 years after surgery, and is no longer recommended. Six out of the seven randomised controlled trials showed gastric bypass to result in low early postoperative mortality and more weight loss one year postoperatively (about 45–65 kg) than gastropasty (about 30–35 kg).

In general the weight loss associated with surgical interventions is greater and more sustained than that achieved by non-surgical methods. Surgery for obesity, however, is associated with complications and morbidity—such as revision of the initial surgery, vitamin and mineral deficiencies due to the modification in gut absorption processes, associated mortality, feeling of fullness, dizziness, and a desire to lie down after eating (dumping syndrome), and faintness, nausea, and vomiting. Due to the complexity of the techniques used only surgical teams which can show experience and a good record (using data from long term follow up) should be allowed to conduct this type of surgery. A large non-randomised matched controlled trial is being undertaken in Sweden which will compare the effect of different surgical and non-surgical interventions on long term weight loss, comorbidity, quality of life, and costs.

MAINTENANCE OF WEIGHT LOSS

Despite the effectiveness of several interventions in promoting short term weight loss, weight regain is common. It is important therefore, to assess the effectiveness of strategies for the maintenance of weight loss. These may be in the form of interventions specifically for maintenance or comprehensive integrated treatment and maintenance regimes.

Ten trials were identified that specifically evaluated interventions to maintain weight loss. Seven of these were concerned with behavioural programmes, mainly looking at continued contact. The evidence from these trials is conflicting.

One of these studies found that a combination of maintenance interventions led to a significantly greater amount of sustained weight loss when compared with a no maintenance control (table). Another showed that adding self help peer groups to therapist led maintenance programmes improved maintenance over a 21 month period (table). More people maintained initial weight loss when participating in a weight focus group (32%), compared with skills focus training (14%), and no treatment (18%) (table).

Only one study investigated the role of pharmacological interventions in the maintenance of weight loss. The drug, sertraline (a selective serotonin reuptake inhibitor), did no better than placebo in terms of weight loss or fat free mass, when given alongside relapse prevention training for a period of 54 weeks.

Combined treatment and maintenance programmes were evaluated in 11 trials. The combination of behavioural treatment, relapse prevention training, and continued therapist contact by post and telephone was shown to be one of the most effective with patients maintaining their original weight loss (10 kg) throughout the 12 month maintenance period (table).

In people who were both overweight and hypertensive, self management techniques and lifestyle changes followed by continued therapist contact during the maintenance phase resulted in greater sustained weight loss than a “usual care” control treatment (table).

Conclusions

Primary healthcare teams need to be more active in developing coordinated programmes of identification and active long term management of high risk and overweight people.

Several preventive and treatment strategies have been shown to be effective in reducing levels of obesity. Progression of obesity in high risk children may be prevented by family treatment and in adults by community based education linked with financial incentives. Interventions to reduce sedentary behaviour in children can also reduce overweight.

Behavioural, dietary, exercise, and drug treatments have all been shown to be effective to some extent in treating adult obesity, especially when used in combination. Because most people begin to regain weight lost a few months after treatment, longer follow up and use of maintenance strategies (such as self help groups) should be an integral part of any weight loss programme. Surgery may have a role in the treatment of morbidly obese people.

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