Outcomes of a community-based weight management programme for morbidly obese populations

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Outcomes of a community based weight management programme for morbid obese populations

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Conflict of Interest:

The authors declare no conflict of interest

Keywords: morbid obesity, community, service evaluation, weight management programme
Abstract

Background: Morbid obesity (BMI >40kg/m²) is an ongoing concern for health care providers worldwide. There is a paucity of research reporting primary care outcomes focussed on complex obesity and morbidly obese populations. National Institutes of Clinical Excellence (NICE) recommends a specialist, multidisciplinary weight management team for the successful management of such populations. This is the first service evaluation which reports primary (weight change) and secondary (BMI, waist circumference, physical activity levels, fruit and vegetable intake and Rosenberg self-esteem score) outcome measures in morbidly and complex obesity patients.

Methods: A prospective observational study of a cohort data set for patients (n= 288) attending their 3 month and 6 month (n= 115) assessment appointments at a specialist community weight management programme.

Results: Patients had a mean (SD) initial BMI of 45.5 (6.6) kg/m²; 66% were females. Over 82% of patients attending the service lost some weight by 3 months. Average weight loss was 3.28 (3.82)% (4.11(4.95) kg) at 3 months and 4.90 (6.26)% (6.30(8.41) kg) at 6 months providing statistically significant weight change at both time points (P<0.001). This meets NICE best practice guidelines for commissioning of services which lead to a minimum of 3% average weight loss, with at least 30% of patients losing at ≥5% of their initial weight. Waist measurement and BMI reduced significantly at 3 months. Improvements were seen in physical activity levels, fruit and vegetable consumption and self-esteem levels (P <0.001).

Conclusion: This service was successful in aiding weight loss in the morbidly obese population. This supports the view that sensible weight loss targets of 3% are realistic for this under-researched population.
Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health (1). Morbid obesity (BMI ≥40 kg/m²) levels are rising in the UK adult population; from 0.2% of men and 1.4% of women in 1993 to 1.6% of men and 3.9% of women in 2013 (2-4). The higher the BMI, the greater the chance of developing obesity-associated conditions such as cardio-vascular disease, diabetes, osteoarthritis and some cancers (1,5,6), resulting in high total healthcare costs (7,8). Additionally, the psychological aspects of obesity have been well documented, with an established relationship between weight loss, better emotional wellbeing and health-related quality of life (9). For the purpose of this paper, ‘complex obesity’ is defined as a BMI ≥35 kg/m² with at least one obesity-related comorbidity.

There are very few published data which evaluate the current NHS service provision within the UK outside of the research context (10-12). NHS services are often set up quickly to provide evidence-based information and support for patient groups. The outcomes of these services may range significantly as statistical analysis and service evaluation outcomes are not often embedded into the service at pre-planning stages, and therefore it is difficult to collect useful statistical data. The lack of published evidence for NHS services, in comparison to commercial slimming organisations, means that is it difficult to provide substantial evidence for the commissioning and decommissioning of services and is unhelpful when bidding for investment for such services. This is particularly relevant in the current climate where widespread financial constraint sees NHS organisations competing against commercial slimming organisations for provision of public health services.
In 2004, the UK government white paper *Choosing health: making healthy choices easier* (13) emphasised the role of primary care in obesity management and recognised primary care as a suitable setting in which to promote weight loss. Despite clinical guidelines for obesity management (4,14-17) and related disease (18), there is little research from primary care about treating morbid or complex obesity populations and indeed, a recent systematic review found no interventions which reported data from solely morbidly obese individuals (19) and research from primary care based on individuals with morbid obesity is limited to a single study. The NHS Glasgow and Clyde Weight Management Service (GCWMS) service evaluation by Logue et al. was based on a large cohort of 1 838 obese patients (BMI ≥30 kg/m² with obesity-related comorbidities or BMI ≥35 kg/m²) which had a mean starting BMI of 43.3 kg/m² and reported weight change data up to 12 months (20). However, it is well recognised that lack of weight loss does not capture the protective benefits of increased fruit and vegetable intake, physical activity or self-esteem (21) all of which are important to the health of this population group. Aside from aiding weight loss maintenance, increased physical activity has been shown to benefit blood lipid profile (22), insulin sensitivity (23) and all-cause and cardiovascular disease mortality (24).

The UK National Institute for Clinical Excellence (NICE) guidelines recommend that primary care physicians and healthcare professionals identify their obese patients and offer clinical management (4,16). Previously, clinically significant weight loss has been defined as a loss of 5-10% of initial weight (4,25), whilst the Scottish Intercollegiate Guidelines Network (SIGN; 2010) recommend a 15-20% reduction for those with a BMI ≥35 kg/m² (14). Evidence suggests that 5–10% of weight loss is associated with meaningful clinical improvements in health-related risk factors, such as serum lipids, glucose tolerance and blood pressure (26,27); although current NICE Public Health guidelines describe a successful weight loss intervention as one which achieves an...
average of 3% weight loss in all patients attending one or more sessions, and at least 30% of patients having lost ≥5% weight loss (16).

There are many barriers to staff raising the issue of weight in primary care, including lack of evidence of efficacy, time, and training (28,29). Widely available options include commercial weight management groups, National Health Service (NHS) or public sector care programmes which vary in quality and duration. Unfortunately, very little evidence exists for the success of these types of programme for specific population subgroups including morbid and complex obesity patients. The present study aimed to investigate the physical, psychological and dietary impact of a 12 week Specialist Community Weight Management Programme (SCWMP) on morbid and complex obesity patients with assessments at 3 and 6 months.

Methods

This service evaluation uses routinely captured data from patients over 18 years old, in a prospective cohort study. The SCWMP was established in August 2010 in-line with NICE recommendations (4). Patients were referred to the service by GPs or health care professionals for a 12-week NHS intervention. Patients were contacted if they were eligible to attend the service and met the inclusion criteria. Patients who did not meet the inclusion criteria were referred to an appropriate alternative service. The most common reasons for exclusion were BMI less than 35kg/m² (or 32.5kg/m² for South Asians), patient presented with other comorbidities that needed to be prioritised prior to weight loss, not motivated to lose weight, or currently engaged in successful weight loss attempts elsewhere.

Inclusion criteria for patients eligible for the service were: Male or female, aged 15 or over; registered with an eligible GP; motivated to make changes to their diet and lifestyle; not
pregnant; BMI ≥35 kg/m² with a comorbidity such as type 2 diabetes, hypertension, sleep apnoea, osteoporosis, depression or BMI ≥40 kg/m² without a comorbidity (≥32.5 kg/m² and ≥37.5 kg/m² for patients of South Asian origin) (44) and that they had tried and failed Tier 1 services previously such as commercial weight management, gym memberships, walking groups and practice nurse weight management advice.

Each eligible patient had a one hour initial assessment appointment with a senior member of the multidisciplinary team (i.e. dietitian, physiotherapist, psychologist) where data on the patients' medical, physical, psychological and social history was collected and a treatment plan was agreed. Treatment plans were tailored to the individuals' needs and consisted of up to 12 contacts via telephone, e-mail, in groups, or face-to-face appointments, over a 12 week intervention period. The contact appointments were delivered by dietitians, physiotherapists, psychologists, cognitive-behavioural therapists, nutritionists, and/or physical activity guides. Staff were trained to embed motivational interviewing and behaviour change techniques into their consultations. Evening and weekend appointments were provided for enhanced accessibility of the service. Patients had an interim assessment at the end of the 3 month treatment period, followed by a further follow-up at 6 months. This analysis includes those who attended their interim assessment appointments.

Demographics and anthropometrics

A detailed multi-component assessment of the patient was achieved using anthropometric measures and questionnaires which were distributed to all patients at three time points: their initial (baseline), interim (3 months) and final assessments (6 months). The primary outcome was weight change from baseline at 3 and 6 months. Secondary outcomes
included physical activity levels, fruit and vegetable consumption, self-esteem score and
BMI.

Anthropometric data was collected in a pre-determined standardised sequence by a
trained staff member. Patients were weighed in kilograms on calibrated scales (Tanita BC-
420MA or Seca 665 high capacity). Height (in metres) was measured at the initial
assessment using a Seca Leicester stadiometer. If the patient was unable to stand, ulna
length was measured, and height was calculated using BAPEN charts (30). Body Mass
Index (BMI) was calculated using weight (in kg) divided by height (in metres) squared.
Waist circumference was measured in centimetres with a standard length, plastic coated
tape measure in line with NHANES III protocol guidelines (31). For patients who were
wheelchair bound or unable to stand, waist circumference was not measured. The
Rosenberg self-esteem scale was used as a measure of psychological wellbeing which is
validated and widely used in the obese population (32,33). It ranges from 0 to 30 with a
higher score indicating greater self-esteem. Fruit and vegetable intake was assessed as
an indicator of dietary quality change using self-reported fruit and vegetable consumption;
options for answers were: 0, 1, 2, 3, 4 or 5+ per day. Seven-day physical activity recall
was used to assess number of minutes of physical activity perceived to be at moderate-
high intensity per week (adapted from the Stanford 7-day recall, (3)). Deprivation quintile
proportions for the cohort was provided by the NHS data analysis team as postcode is
considered identifiable data (34).

**Statistical analysis**

Data from the patient records was analysed using SPSS (v. 18). Frequency data describes
the baseline data. Means, modes, medians, standard deviations, standard error and
significance of the data was analysed using appropriate methods for parametric or non-
Change in parametric data were analysed using paired T-tests. Non-parametric data (fruit and vegetable portions and Rosenberg score) was analysed using Wilcoxon Signed Ranks test. Data was deemed to be significant if $P < 0.05$. A regression analysis of change in BMI, (both kg and percent) was completed using STATA 14. Explanatory variables were age, gender, ethnicity, physical activity, fruit/vegetable intake, self-esteem, number of session attended, and type of therapist used.

Ethical approval was not sought as the focus on service evaluation in the UK, is subject to different guidance in accordance with National Research Ethics Service (2009), thus exempting the work from the need for ethical approval (35).

Results
The majority of patients who attended an initial assessment were aged 35 to 65 years.

Thirty-four per cent of the patients accessing and completing the service to interim were male (Table 1)

### Table 01: Demographic data of patients at baseline and at final assessment

<table>
<thead>
<tr>
<th></th>
<th>baseline (n= 288)</th>
<th>final (n= 115)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>98 (34)</td>
<td>44 (38)</td>
</tr>
<tr>
<td>Female</td>
<td>190 (66)</td>
<td>71 (62)</td>
</tr>
<tr>
<td><strong>Age Range (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-24</td>
<td>9 (3.1)</td>
<td>1 (0.9)</td>
</tr>
<tr>
<td>25-34</td>
<td>31 (10.8)</td>
<td>14 (12.2)</td>
</tr>
<tr>
<td>35-44</td>
<td>67 (23.3)</td>
<td>29 (25.2)</td>
</tr>
<tr>
<td>45-54</td>
<td>73 (25.3)</td>
<td>27 (23.5)</td>
</tr>
<tr>
<td>55-64</td>
<td>71 (24.7)</td>
<td>32 (27.8)</td>
</tr>
<tr>
<td>65+</td>
<td>37 (12.8)</td>
<td>12 (10.4)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td><strong>BMI (kg/m²)</strong></td>
<td>45.5 (6.6)</td>
<td>43.5 (7.5)</td>
</tr>
<tr>
<td><strong>Weight (kg)</strong></td>
<td>126.9 (21.5)</td>
<td>120.3 (2.0)</td>
</tr>
<tr>
<td><strong>Waist circumference (cm)</strong></td>
<td>130.7 (14.6)</td>
<td>125.1 (1.4)</td>
</tr>
<tr>
<td><strong>Minutes of physical activity</strong></td>
<td>113.2 (233.2)</td>
<td>213.6 (248.1)</td>
</tr>
<tr>
<td><strong>Fruit &amp; Vegetables (portions/day)</strong></td>
<td>2.6 (1.5)</td>
<td>4 (1.2)</td>
</tr>
<tr>
<td><strong>Rosenberg self-esteem score</strong></td>
<td>16.8 (6.1)</td>
<td>20.3 (6.2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of different therapists seen</th>
<th>0</th>
<th>1 (0.3)</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38 (13.2)</td>
<td>12 (10.4)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>144 (50.0)</td>
<td>61 (53.0)</td>
<td></td>
</tr>
<tr>
<td>3 or more</td>
<td>105 (36.4)</td>
<td>42 (36.5)</td>
<td></td>
</tr>
</tbody>
</table>

Patients who attended seven or more of their booked appointments were considered to have engaged well with the service. The mean (SD) average number of sessions attended was 9.3 (1.75) with 95 out of 288 (33%) people completing 10 out of a maximum of 12 sessions during the intervention period. There was significant loss to follow up (60%) between the 3 and 6 month appointments.
Deprivation data demonstrated that the service was accessed equitably by patients from all deprivation quintiles, including the two most deprived quintiles who comprised 53% of attendees.

**Primary outcome**

**Weight change**

There were statistically significant declines ($P < 0.001$) in weight at 3 month and 6 month assessments.; the mean average (SD) weight loss at 3 months was 4.11 (4.95) kg, 1.24 (4.11) kg between 3 and 6 months, and 6.3 (8.41) kg total weight loss at 6 months (Tables 2 and 3). This equates to an average weight loss of 3.28 (3.82)% at 3 months, and average total weight loss of 4.90 (6.26)% for patients attending their 6 month assessment. Overall, 82% of patients who attended their interim appointment lost some weight at 12 weeks, with 79.5% having lost some weight at their 6 month final assessment.

**Table 02: % of patients in the study cohort stratified by weight change at interim and final assessments**

<table>
<thead>
<tr>
<th>Weight change</th>
<th>Interim (%) n= 288</th>
<th>Final (%) n= 115</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥10% loss</td>
<td>5.2</td>
<td>17.1</td>
</tr>
<tr>
<td>≥5-9.99% loss</td>
<td>19.1</td>
<td>28.3</td>
</tr>
<tr>
<td>≥3-4.99% loss</td>
<td>24.3</td>
<td>16.2</td>
</tr>
<tr>
<td>0-2.99% loss</td>
<td>36.1</td>
<td>17.9</td>
</tr>
<tr>
<td>Gained</td>
<td>14.6</td>
<td>19.7</td>
</tr>
</tbody>
</table>
Table 03: Mean (SD) weight, BMI and waist circumference changes in patients between initial, interim and final assessments

<table>
<thead>
<tr>
<th></th>
<th>Change at 3 months</th>
<th>P value</th>
<th>Change between 3-6 months</th>
<th>P value</th>
<th>Overall change at 6 months</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>-4.11 (4.95)</td>
<td>&lt;0.001</td>
<td>-1.24 (4.11)</td>
<td>0.002</td>
<td>-6.30 (8.41)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>n= 287</td>
<td></td>
<td>n= 115</td>
<td></td>
<td>n= 115</td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>-1.46 (1.73)</td>
<td>&lt;0.001</td>
<td>-0.42 (1.41)</td>
<td>0.002</td>
<td>-2.18 (2.84)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>n=287</td>
<td></td>
<td>n= 115</td>
<td></td>
<td>n= 115</td>
<td></td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>-4.08 (5.12)</td>
<td>&lt;0.001</td>
<td>-0.82 (4.34)</td>
<td>0.45</td>
<td>-5.64 (7.61)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>n=282</td>
<td></td>
<td>n=115</td>
<td></td>
<td>n= 115</td>
<td></td>
</tr>
</tbody>
</table>

Secondary outcomes

need a sentence here about the secondary outcomes

Table 04: Mean (SD) physical activity, fruit and vegetable intake and Rosenberg self-esteem score in patients between initial, interim and final assessments

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>mean change 0-3 months</th>
<th>Interim 3 months</th>
<th>mean change 3-6 months</th>
<th>Final 6 months</th>
<th>overall mean change 0-6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity (mins/week)</td>
<td>113.2 (233.2)</td>
<td>123.2 (363.5)</td>
<td>237.9 (362.4)</td>
<td>-37.9 (254.0)</td>
<td>214.1 (246.8)</td>
<td>107.4 (209.7)</td>
</tr>
<tr>
<td></td>
<td>n= 287</td>
<td>P &lt;0.001</td>
<td>n= 283</td>
<td>P= 0.146</td>
<td>n= 96</td>
<td>P &lt;0.001</td>
</tr>
<tr>
<td>Fruit and vegetable</td>
<td>2.6 (1.5)</td>
<td>1.0 (1.3)</td>
<td>3.6 (1.3)</td>
<td>0.3 (0.7)</td>
<td>4.0 (1.2)</td>
<td>1.3 (1.4)</td>
</tr>
<tr>
<td>intake (portions/day)</td>
<td>n= 287</td>
<td>$P &lt; 0.001$</td>
<td>n= 283</td>
<td>$P &lt; 0.001$</td>
<td>n= 97</td>
<td>$P &lt; 0.001$</td>
</tr>
<tr>
<td>----------------------</td>
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<td>-------------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>Rosenberg self-esteem score</td>
<td>16.8 (6.13)</td>
<td>$P &lt; 0.001$</td>
<td>19.9 (6.26)</td>
<td>$P = 0.066$</td>
<td>20.3 (6.23)</td>
<td>$P &lt; 0.001$</td>
</tr>
<tr>
<td></td>
<td>3.1 (5.4)</td>
<td></td>
<td>0.6 (3.5)</td>
<td></td>
<td>3.6 (5.6)</td>
<td></td>
</tr>
</tbody>
</table>

In the regression model, none of the variables were identified as being predictive of weight loss at 3 or 6 months except change in physical activity level which was positively associated with weight loss at 6 months (95% CI 0.170-0.001; $P = 0.028$).
Discussion

This paper presents data from a relatively large sample size (n= 288) of complex and morbidly obese individuals who have attended a well-designed, multi-professional specialist weight management programme. The analysis shows that for patients who attend the service, SCWMP is a successful way to aid weight management and improve their overall wellbeing. We conclude from the data presented, that for those patients who attended their planned sessions, the prevention of weight gain is likely to be achieved by over 80% of patients, regardless of their age, ethnicity or gender.

The current study shows that at 3 months, 24.3% of patients actively participating in the programme had lost 5% or more of their weight, and by 6 months, 45.4% of patients had lost more than 5% of their initial weight. Previous research has reported a variety of weight losses at 12 weeks (29,36-38), from 54.7% of patients (who completed at least 10 sessions of a Slimming World programme) who lost over 5% of their initial weight (38), and the Lighten Up study which demonstrated 16-46% of patients lost more than 5% weight (36). The mean BMI for patients in the present study was 45.5 (6.6) kg/m² which is considerably higher than previously published data sets which ranged from 31.4 (2.6) kg/m² (39) to 39.7 (6.9) kg/m² (37). Whilst these findings from this study are lower than previously published data, the mean baseline BMI was higher in this study. This highlights caution when comparing studies as percentage weight loss can mean significantly different absolute (kg) weight losses depending on the initial average BMI of the study populations.

There is a stark similarity between the weight loss results from this intervention and the NHS GCWMS service evaluated by Logue et al. (2014) on a large cohort of complex and severe obesity patients which had a mean starting BMI of 43.3 kg/m² and reported weight change data up to 12 months (20). At 3 months, 25% of all completers had lost ≥ 5% of their starting weight (compared to 24.3% in the present study) and at 6 months 44% of all completers had lost ≥ 5% (compared to 45.4% in the present study). Based upon this
limited available evidence on complex and morbidly obese populations, it may only be possible to achieve a 5% weight loss in fewer than 50% of patients by 6 months. Further follow-up studies on complex obesity patients are needed.

Overall, 82% of patients who attended their interim appointment lost some weight at 12 weeks, with 79.5% having lost some weight at their 6 month final assessment. Prevention of weight gain was achieved by 85.4% of patients at interim, 80.3% at final. This is notably less than in the research presented by Stubbs *et al.* who found that prevention of weight gain was achieved in 92.1% (38), and 96.3% (12) of patients at 6 months. The reason for these differences is beyond the remit of the current evaluation, and could be addressed with further research.

By interim assessment, 21.5% of patients reported that they do zero minutes of moderate-high physical activity per week, which improved slightly to 19.6% of patients by their final assessment. In 2010, 20% of respondents in the Health Survey for England reported that they took walks of at least 20 minutes “less than once a year or never” (40), which is in line with the findings from this study. Patients were able to engage with increased physical activity with support, but once they had finished the intensive input stage of the programme, they did not increase activity further.

The increase in Rosenberg scores at interim and final assessment were statistically significantly improved from baseline ($P < 0.001$) which is indicative of higher self-esteem. However, evidence is lacking as to whether an increased Rosenberg score impacts upon ability to lose weight although the relationship between low self-esteem and obesity is well established in children (41).
Fruit and vegetable intake increased throughout the intervention and follow-up period (see Table 04) indicating that patients may continue to make dietary changes even after the intensive intervention has finished. The most recent Health Survey for England (2012) found that adults aged 19 to 64 years on average consumed 4.2 portions of fruit and vegetables per day, with older adults consuming a mean average of 4.4 portions (40). Therefore the data presented shows that this study population group at baseline were consuming less than the mean average portions of fruit and vegetables per day. During the SCWMP, they appear to be engaging with dietary changes and increasing their fruit and vegetable consumption in line with the rest of the general population. This supports the conclusions of Carlson et al. (2012) who reported that increase in fruit and vegetable intake may be one of the easiest health-promoting behaviour changes to make (42). While portions of fruit and vegetables increased on average, self-reported data is subject to reporting bias. In this study the maximum number of portions of fruit and vegetables per day which could be recorded as consumed was 5. It would be reasonable to estimate that some patients will eat more than 5 portions per day and therefore the mean averages are based on a worst case scenario. This is beneficial as Wang et al. (2014) demonstrated a significant correlation between increased fruit and vegetable intake and reduced all-cause mortality, particularly cardiovascular mortality (43), with Tapsell et al. (2014) reporting that increased vegetable consumption as part of a calorie-controlled diet results in greater weight loss, which appears to be sustainable (44).

The improvement in results across all measures demonstrates the benefits of the specialist multidisciplinary team supporting a variety of patients’ needs to be attended to within a single service. The SCWMP was designed in line with NICE and Grace recommendations (4,16,17) and the inclusion of a multidisciplinary team may have
contributed to the holistic improvement of this patient group. Unlike many of the papers which were examined in the literature review, there were no statistically significant differences in weight change or secondary outcome measures by age, ethnicity, gender, attendance, therapist seen or continuity of same therapist. This may be due to the thorough assessment of patients at their initial assessments and the flexibility of the programme which ensures that patients are seen by the most appropriate clinician or clinicians at the most appropriate time or that the changes in weight reported are seen predominantly in those with simple obesity or a BMI less than 35kg/m². However, it is interesting to note that the patients who attended the service for the initial assessment were more likely to be over 35 years old.

Data presented in this study is intended to help generate debate over realistic target weight losses for morbidly obese patients, and emphasises the importance of longer term multi-disciplinary specialist weight management programmes to aid patients to achieve physical, social and psychological benefits; not with a pure focus on weight loss targets. Many obese individuals report long-lasting effects of obesity-related stigma due to a focus on weight, which leaves them less likely to engage in health promoting activities and health care services (45,46); and experience stigma-related mental health issues such as depression, anxiety, low self-esteem, and psychological stress (47). This leads to debate as to whether body weight is a realistic or ethical target within public health interventions (48) and whether more holistic “health promotion” services are indeed more beneficial than weight management, with the movement of the ‘Health at Every Size’ agenda (http://www.haescommunity.org/).
Strengths and Limitations

This study provides a “real-life” insight as to how weight management interventions are attended in practice in NHS settings, and highlights achievable outcomes in the morbidly and complex obese populations. Data is lacking in this area, and it is well-recognised that attrition rates are high (49), and engagement with male patients, and those of low socioeconomic status has previously been reported to be poor (50,51). However, in this study, 38% of subjects who completed the 6 month intervention were males, and engagement with patients from low socioeconomic groups was high, which supports the findings of Moroshko, Brennan and O’Brien (2011) who concluded that whilst many factors have been suggested to correlate with attrition, no individual factor had been consistently identified (49). It is hypothesised that providing a holistic, multi-disciplinary assessment at baseline encouraged otherwise poor engagers to attend the service as it was tailored to the individuals’ needs.

Unfortunately, these results are representative of only one city in the UK and further research is therefore required to compare similar services throughout the UK, and internationally which have a specific provision for morbidly and complex obese individuals.

Larger data sets with longer-term follow up would also be beneficial, with the data sets following patients from baseline through to completion. However, attrition rates are notoriously high, and participant engagement post-intervention period is low (52). In future studies the improvement of data collection would be valuable, for example an improved fruit and vegetable scale, and the addition of blood biochemistry e.g. blood lipid profiling and anthropometry measures at each assessment period.

Implications for future practice and recommendations for service improvement

Due to the nature and complexity of morbidly obese patients, a holistic service evaluation
is necessary, and it is unhelpful to use weight change as a sole primary outcome for service evaluation. Data from this service evaluation was considered during the development of the new NICE Public Health guidelines (2014), which suggests a 3% weight loss target is beneficial for this patient group, and is a more realistic target for commissioners to be using in tenders (16). The impact of increased physical activity, self-esteem (alongside other measures of mental health status) and dietary quality should be recognised, and these attributes should be addressed within the service by specialist multi-disciplinary teams (14,16,17).

Data from this population group is lacking, and provision should be made by commissioners for data collection and thorough service evaluation, with statistical support. Data collected by each service should be standardised to aid ease of comparison, and can be collected using the NOO Standard Evaluation Framework (2009) (53). It is crucial that this data is available in the public domain to improve the understanding of factors which are pertinent to effective services and to aid service development, design and commissioning in the future.

**Conclusion**

By six months, over 60% of patients who actively engaged with the SCWMP lost 3% body weight or more. Therefore, the service appears valuable in aiding weight loss in the morbidly obese population for those patients. Results appear comparable to those provided in previously published studies although it is recognised that data based on comparable populations is lacking.

In the longer term, additional studies need to be commissioned to fill gaps in knowledge
surrounding the impact of current acute or community weight management services in the
UK in morbidly obese populations, and provide more qualitative or mixed methods analysis
to add depth to our understanding of the current issues, and design suitable programmes
with which these populations will successfully engage.

Conflict of Interest

The authors declare no conflict of interest
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